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With warm regards,

(Debal C Kar)

Regulatory framework for water services in the state of Gujarat

Volume I

Prepared for **Gujarat Infrastructure Development Board**

Gandhinagar

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Thanks are also due to Ms K Radhika for secretarial assistance.

Abbreviations

ADB	Asian Development Bank
AMC	Ahmedabad Municipal Corporation
AMC	Ahmedabad Municipal Corporation
AUA	Ahmedabad Urban Agglomeration
AUDA	Ahmedabad Urban Development Authority
BIS	Bureau of Indian Standards
BIS	Bureau of Indian Standards
BOD	Biochemical oxygen demand
BOOT	Build own operate transfer
BOT	built operate transfer
BWSSB	Bangalore Water Supply and Sewerage Board
C&AG	Controller and Auditor General
CA	Concession agreement
CA	Constitutional Amendment
CERC	Central Electricity Regulatory Commission
CMA	Chennai Metropolitan Area
CMC	Chennai Metropolitan Corporation
CMWSSB	Chennai Metropolitan Water Supply and Sewerage Board
CPHEEO	Central Public Health Environmental Engineering Organisation
CrPc	Code of criminal procedure

CWSS	Cauveri Water Supply Scheme
DETR	Department of Environment, Transport, and Regions
DO	Dissolved oxygen
DOS	Bureau of Water Works
DWI	Drinking Water Inspectorate
DWR	Department of Water Resources
EA	Environment Agency
EC	European Commission
EEC	European Economic Commission
EMOS	Empresa Metropolitana de Obran Sanitarian
ETOSS	Ente Tripartite de Obras de Servicios de Saneamiento
GERC	Gujarat Electricity Regulatory Commission
GIDB	Gujarat Infrastructure Development Board
GoK	Government of Karnataka
GoTN	Government of Tamil Nadu
GSDWICL	Gujarat State Drinking Water Infrastructure Company Limited
GWRDC	Gujarat Water Resources Development Corporation
GWSSB	Gujarat Water Supply and Sewerage Board
IA	Independent Auditors
IE	Independent Engineers
IL&FS	Infrastructure Leasing & Financial Services Limited
JVC	Joint Venture Company

K&C	Koramangala and Challabhata
KUWSDB	Karnataka Urban Water Supply and Drainage Board
LPCD	Litres per capita per day
MAF	Million acre feet
MCM	Million cubic metre
MLD	Million litres per day
MoU	Memorandum of understanding
MUD	Ministry of Urban Development
NMC	Narmada Main Canal
NRV	Net rateable value
NTADCL	New Tirupur Area Development Corporation Limited
OE	Over exploited
O&M	Operation and maintenance
OERC	Orissa Electricity Regulatory Commission
OFWAT	Office of Water Services
OSN	Obras Sanitarias de La Nation
PSC	Public Service Commission
PSP	Private Sector Participation
PUC	Public Utilities Commission
PWD	Public Works Department
QOS	Quality of service

RMC	Rajkot Municipal Corporation
ROM	rehabilitate, operate and maintain
ROT	Rehabilitate operate transfer
RUDA	Rajkot Urban Development Authority
SAMAPA	Servicio Autonomo Municipal da Agua Potable y Alcantarillado
SDA	Superintendencia de Aguas
SENDOS	National Service of Water and Sewerage Works
SPV	Special purpose vehicle
SSNN	Sardar Sarovar Narmada Nigam
SSNNL	Sardar Sarovar Narmada Nigam Limited
SSP	Sardar Sarovar Project
SSS	Superintendent of Water and Sewerage Services
TACID	Tamil Nadu Corporation of Industrial Infrastructure Development Limited
TADP	Tirupur Area Development Programme
TDS	Total dissolved solids
TEA	Tirupur Exporters Association
TLPA	Tirupur Local Planning Area
TM	Tirupur Municipality
TNPCB	Tamil Nadu Pollution Control Board
TRAI	Telecom Regulatory Authority of India
TWAD	Tamil Nadu Water Supply and Drainage Board

ULBs	Urban local bodies
USAID	United States Agency for International Development
USERS	Urban Services Environment Rating System
WHO	World Health Organization
WRA	Water Regulatory Authority
WRO	Water Resources Organisation
WTP	Willingness to pay

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Executive summary

Introduction

A review of the current state of the water sector in Gujarat revealed that distribution of water resources in Gujarat is uneven leading to significant over exploitation of groundwater in the water deficient areas. In addition, the state has a complex institutional structure with multiple agencies and overlapping jurisdictions with many SPVs (special purpose vehicles) in the water sector for the execution and operation of specific projects, principally those linked with the Sardar Sarovar project.

Augmentation of water supply and improvements in water quality will call for significant investments. It has been recognised that the state cannot finance these activities on its own. That private investment in the water sector would be required to augment the efforts of the state has been recognised in Gujarat. A need was felt to have an enabling framework to introduce private sector participation, which would address many complex issues to balance the interests of both the consumers and the investors in the liberalised environment in Gujarat. In this context, the Government of Gujarat undertook a study, and the GIDB (Gujarat Infrastructure Development Board), Government of Gujarat, assigned the task to TERI (Tata Energy Research Institute), New Delhi.

The objectives of the study were two fold. One, to identify and suggest changes in the provisions in the existing legislation to facilitate the privatisation in the water sector. Second, to develop an enabling regulatory framework to facilitate private sector involvement in the water sector. The methodology adopted was a combination of literature surveys, interaction with experts, discussions with agencies and organisations in this area, field visit to Ahmedabad Municipal Corporation, Rajkot Municipal Corporation, and water supply agencies in Bangalore and Chennai, and a review of the current regulatory structure in place along with the legal provisions in Gujarat governing such regulatory structure.

Gujarat's water sector

While south Gujarat has abundant water resources, North Gujarat, Saurashtra and Kutchh are water deficient areas. This has adverse effect on exploitation of ground water. However, the proportion of groundwater in the total supply is projected to decrease in the future as large surface water schemes are being commissioned, notably the Sardar Sarovar based Narmada Main Canal. Nevertheless, even after accounting for

the groundwater and surface water availability, there would be significant shortfall in water supply. This is proposed to be met by water conservation and recycling activities.

The shortfall in urban areas is even more critical and requires substantial investments in developing new sources of water as well as strengthening of the water supply distribution network. The shortfall of drinking water supply in the six municipal corporations has been projected at 986 mld by 2010, calling for an investment of Rs. 8609 million by 2010. Additional investments are also required to rehabilitate the existing distribution network.

A study of the Ahmedabad Municipal Corporation showed that there exist significant exploitation of ground water, low availability of water supply, service standards being administered through a newly introduced citizen's charter, technical quality of water followed according to IS-10500 standards, tariff not linked to consumption of water, significant differences between cost of water supply and the existing tariff, and involvement of private parties in discrete functions such as pumping of water and operation of water treatment plants. A similar picture also emerged during the study in Rajkot Municipal Corporation when there exist considerable subsidization in water sector, significant cross subsidization within the sector, private sector involvement only through service contracts, and water charges not being linked to consumption of water.

Private sector participation in India and other countries

The options for PSP (private sector participation) can take different forms. Such options would include service contracts, BOT/BOOT/ROM, management contract, lease contract, concession contract, and divestiture. The water cycle can either be unbundled and opened in a segmented fashion to private sector participation, or the entire water cycle can be opened to such process. Depending on the PSP options, benefits accruing in the sector would vary.

There have been very little in terms of private sector participation initiatives in the water sector in India. Even the initiatives that have taken place have been confined to discrete functions and to more primitive forms of PSP as in management and service contracts. In Tamil Nadu, the private sector participation has been allowed in sourcing of water, treatment of water, reverse osmosis plants, and transportation of water by tankers, all in Chennai, and, through BOT for the entire water cycle in Tripur project. Similarly, some initiatives have already taken place in Karnataka for augmentation of its water supply in Bangalore as well as treatment of wastewater in the city.
Private sector participation in areas such as billing and collection, meter installation, etc., as in Mexico City; for contracting out operation of the existing treatment works as

in Puerto Rico, and for creating new assets through BOOT options as in Thailand, for managing the water services through concession contracts in Bolivia, Chile and through divestiture in UK, are some international examples of PSP.

Scope for private sector participation in Gujarat

The major area of concern in Gujarat's urban water supply is how to minimise losses in the distribution network as well as to augment the water sources. In spite of being identified as priority areas for initiating private sector participation, there does not appear to be any significant privatisation initiative in the water sector in municipal corporations in Gujarat. It is important to recognise that given the criticality of the demand-supply gap in the area, and the consequent investment requirements, private sector involvement may result in additional investments in this sector, given right kind of the enabling environment. The GSDWICL (Gujarat State Drinking Water Infrastructure Company Ltd) has also identified some projects for the purpose of construction of the bulk distribution network for the Sardar Sarovar scheme to be executed with substantial private sector participation.

The following methodologies for introducing sectoral reforms as well as for introducing private sector participation in the water sector in Gujarat, may be examined in greater detail:

- Since the Sardar Sarovar Narmada Nigam Ltd has raised a large amount of capital on commercial terms for the laying down of the canal network for bulk transmission of water, it is recommended that the company operates on commercial lines by charging an economic price for the water supply.
- Given the marginal share of GWRDC (Gujarat Water Resources Development Corporation) in the groundwater sector in the state, it is recommended that GWRDC be completely privatised, either by transferring the tubewells to farmers' co-operatives, or by divesting it to the private sector.
- All projects owned and operated by Department of Narmada, Water Resource and Water Supply should also be operated on commercial lines and each project should be made into a profit centre.
- Should the State Government/local bodies recognize the need to subsidise any segment of water cycle, then the subsidy should be explicitly accounted for in the operation of these projects and provided through the State/local bodies' Budget.
- It is recommended that GSDWICL should not rely completely on budgetary support for executing its project. The option for identifying a strategic partner and setting up a joint venture for executing the project should be examined.

- The GWSSB should only work as an agency for the execution and operation of water sector projects, as its regulatory and advisory role will rest with the independent regulator, as discussed in the next sections.
- A complete divestiture of the distribution network in urban local bodies can be explored as an option for those sections of the distribution network that could be isolated from the rest of the network.
- The water supply activities of the local bodies can be hived off as separate commercially operated companies with assistance from a strategic partner, and over time, consider complete privatisation of these companies.
- For strengthening the existing distribution network in some of the smaller municipal corporations and larger municipalities, the ROT (Renovate, operate, and transfer) mode of privatisation could be explored. Wherever the distribution network has not been laid, PSP could take the BOT form, wherein the private operator would also lay down the distribution network.
- For local bodies that are not very large, management and service contracts may be assigned to the private sector in discrete activities like operation of pumping stations and water treatment plants, billing, etc.

Legal impediments to private sector participation

There is no legal barrier to private sector participation in the water sector in Gujarat. The existing laws/acts such as the Gujarat Infrastructure Development Act 1999, the Bombay Provincial Municipal Corporations Act 1949, the Gujarat Municipalities Act 1963, the Gujarat Act No. 18 1979, and the Gujarat Panchayat Act 1993, permit such participation. All forms of PSP, can be adopted in Gujarat, and implemented within the framework of these laws.

Regulatory framework

The scope of PSP has been discussed earlier, and it has been stipulated that the proposed corporations or the new developers would be the service providers and are expected to run on commercial principles. A fall out of the privatisation process is the likely increase in transaction costs, which have to be mitigated. The activities of the service providers in the monopoly segments of the water cycle would have to be regulated for protecting the interests of consumers. A strong regulatory framework, which would not only protect the interests of the investors, but also balance them with the public interest in general would be called for. Such a regulatory framework has to exist outside the existing governmental set up, and should have an arms-length relationship with the government as well as local bodies.

It is recommended that there should be a WRA (Water Regulatory Authority) which should maintain an arms-length relationship with stakeholders, including government as well as local bodies, and regulate segments of water supply. It is further recommended that the WRA should be constituted before the water sector is opened in Gujarat. The WRA should be positioned through independent legislation incorporating various provisions as discussed below. The WRA should have jurisdiction over the whole state of Gujarat and should regulate the following segments of water supply system:

- Capturing the sources
- Transmission (also called 'conveyance') of water
- Distribution of water

Design issues

Scope

It is recommended that the WRA should have the following functions.

- To frame principles for determination of tariff for water services during Phase I of the regulatory process, not exceeding 3 years. During the Phase II of the regulatory process, the WRA should regulate tariff – retail and bulk.
- To lay down and enforce minimum standards of service, and to also monitor the above standards through surveys. As regards the water quality, either the regulator or the relevant government agency should be assigned to determine the minimum water quality standards, and ensure their enforcement.
- To promote economy and efficiency in the water supply services in Gujarat.
- To facilitate competition in water sector in Gujarat.
- To adjudicate disputes and differences amongst various service provides or / and between a service provider and a group of consumers.
- To recommend generic terms and conditions of the new concession agreement in water sector as well as to recommend terms and conditions of a specific concession agreement, if required by the Government.
- To monitor terms and conditions of all new concession agreements between developers and local bodies in water sector.
- To aid and advise the Government for developing a Water Use Policy for Gujarat, and monitor such annual water use on the part of the local bodies as well as to co-ordinate with other regulators such as Gujarat State Pollution Control Board for framing and evolving guidelines for sustainable water use in the state.
- Perform such functions as are assigned to it by the Government of Gujarat at a later date.

Although the current study examined the functioning of the WRA in water supply, it is suggested that these areas should be extended to sewerage as well so that the WRA, for the sake of integrated water management, should have the regulatory oversight over the water and sewerage sector in the state.

The WRA should be advised by an Advisory Committee. The composition of the Advisory Committee should be determined by the WRA in consultation with the Government of Gujarat, and it should include interests of local bodies in addition to representing interests of industry, agriculture, labour, consumers, non-Governmental organisations, academic, research bodies in the water sector. The functions of the Advisory Committee shall be to advise the WRA on major questions on policy, on matters relating to tariff and quality of service, matters relating to protection of consumer interests and overall standards of performance of service providers.

Independence

If the WRA is required to effectively discharge its duties under the statute, it should enjoy some degree of freedom for its functioning. This independence, however, cannot be absolute. This means that it will be subject to the laws of the land, and the policy of the Government. Its autonomy has to be guaranteed by law. It is, therefore, recommended that the selection process of members of the regulatory body is open and transparent, removal of members of should be through a transparent process, and only on the advice from an independent authority such as the State High Court, and finally, to ensure the financial independence of the regulatory authority, the authority shall have its own fund and all receipts of the authority, including grants from the State Government, should be credited thereto and all payments by the authority shall be made therefrom.

Accountability

To ensure accountability of the regulatory process, it is recommended that:

- The authority should ensure transparency during the regulatory process.
- The WRA should undertake judicial proceeding while discharging its dispute settlement function.
- The consultative process is preferable to formal hearings in as much as it provides for a comprehensive discussion of issues with different stakeholders and, thus, is less costly and less time consuming. Thus the consultative processes should be encouraged in the regulatory process except in the dispute settlement cases.
- An appeal against the decision of the WRA must be to an independent body and should be on a question of law. The appellate authority could be a High Court or a Tribunal in Gujarat with quasi-judicial powers.

- The authority should maintain proper accounts, and prepare an annual statement of accounts in such form as may be prescribed in consultation with the Comptroller and Auditor-General of India.
- Its accounts should be audited by the Comptroller and Auditor General of India.
- Its accounts must to be certified by the Comptroller and Auditor-General, and shall be forwarded annually to the State Government by the authority. The State Government shall cause the audit report to be placed/labelled, as soon as may be after it is received, before the State Legislature.
- The authority shall prepare, once every year, in such form and at such time as may be prescribed, an annual report including a summary of its activities during the previous year and copies of the report shall be forwarded to the State Government. A copy of such report should be labelled before the State Legislature.

Powers

The WRA should have adequate power to ensure compliance of its order and 'directions'. If these are violated, there should be adequate punishment. The WRA shall, for the purposes of any inquiry, have the powers of a Civil Court while trying a suit. The Authority may call upon the specified Government company or any person to furnish to the authority periodically, or, as and when required, any information concerning its or his activities related to water supply.

Framework for tariff regulation

The pricing of water in Gujarat is one of the functions assigned to the municipal and local bodies. Under the existing structure, most consumers pay according to the rateable value of their property (or a flat rate) and the actual consumption of water is not measured. This has resulted in a number of distortions, including inefficient use of water, and also raises questions of equity. The pricing for the water supply has no relation with the cost of supply. Further, given the bundled accounting procedures and the information systems, it is not even possible to calculate accurately the cost of water supply.

In the context of attracting private capital in the water sector, tariff reforms has become critical. Based on the feedback from the Government of Gujarat, a phased program for tariff regulation is suggested. During the first phase (called Phase I), which will last for three years, the focus will be on development of regulatory capacity and in undertaking the basic tasks essential for full-fledged regulatory intervention in the second phase. In Phase I, the regulatory authority will prescribe the principles to be used

for tariff determination. In addition, it would conduct a cost of service study to assess the extent of subsidy and cross-subsidy in the prevalent tariff structure. Finally, it would formulate a plan in consultation with the State Government to optimise the subsidy requirement and the delivery mechanisms. The latter would include rationalisation of the retail tariff, in the areas indicated by the Government of Gujarat, to meet all justified expenditure on O&M (operation and maintenance) within the Phase I. The O&M expenditure would interalia, include the cost of repair, maintenance, administrative costs and the employee costs. This would imply that from the existing level, the tariff would be increased to cover 100% of the justified O&M expenditure within three years of Phase-1. It is suggested to phase the increase as 50%, 25% and 25% in year 1, year 2 and year 3 respectively.

In Phase II, the regulatory authority should directly regulate prices for bulk water supply in all cases and, for prices for retail water supply, in the areas to be declared by the Government of Gujarat. It is suggested that during this phase, the regulator may determine the retail prices in the six municipal corporations to begin with. For other areas, the regulator should regulate the retail tariff indirectly.

For direct regulation, the regulator would actually determine the set of prices at periodic intervals. The concerned utility shall be required to file with the regulator an application seeking an amendment in the tariff structure. For other local bodies, governed by indirect regulation, the power to determine the tariff shall still remain with the regulator, but it shall be executed through local bodies. The regulator would specify the objectives, the principles and the procedure to be followed for the determination of the tariff. The local body, according to the specified formula would then determine the price. It would be necessary to file with the regulator, all necessary information whenever a change in the tariff is effected.

During Phase II, a two-tier regulatory structure is suggested: demand charge to recover a portion of the fixed costs associated with the cost of providing supply, and variable charges to cover the OM cost and the balance of the fixed costs. The principles to be followed during the tariff design are:

1. To promote efficiency and economy in the activities of the sector.
2. To secure the financial viability of the entities in the sector.
3. To provide incentives for optimum investment.
4. The tariff should reflect the cost of supply of providing water.
5. The tariff should be fair, just and non-discriminatory.
6. The tariff structure will be unbundled to reflect the cost of providing different services.
7. The tariff, to the extent possible, should be simple and easy to understand and implement.

The tariff determination process should be invariably consultative, and should not be quasi judicial.

Framework for water quality standards

The Government of Gujarat or WRA should formulate the minimum drinking water quality standards as per the BIS standards and the framework for water quality surveillance for the service provider. The scope of water quality monitoring, number of parameters to be analysed and sampling and analysis methodology could be modified as per the WHO/ EC guidelines taking into consideration local conditions, raw water source and past track record.

The Government of Gujarat or WRA, as the case may be, should always ensure that the service provider meets the bacteriological quality and residual chlorine requirements, irrespective of the local conditions and the raw water source.

Legislative changes

The positioning of the WRA and with the functions as stated above, would require certain changes in following acts/laws, a tentative list of which has been placed at Chapter 9:

- The Gujarat Infrastructure Development (GID) Act, 1999
- The Bombay Provincial Municipal Corporations (BPMC) Act 1949
- The Gujarat Municipalities Act (GMA) Act 1963
- The Gujarat Act No. 18 of 1979
- The Gujarat Panchayat Act 1993

It is however recommended that a detailed scrutiny of the Acts/rules for carrying out such changes should be carried out whenever the legislation constituting the WRA is proposed. In addition, while amending the acts, the spirit of the 73rd and the 74th Constitutional Amendments should not be violated.

Agenda for action

Regulatory reforms, as discussed in the previous chapters alone would not be sufficient for bringing about a marked improvement of water services in Gujarat today. It is necessary to introduce substantial reforms in the sector. This would include developing a sector vision document, improvements in operational and maintenance practices, institutional restructuring, tariff reforms, apart from regulatory reforms in the sector. An appropriate study to devise a sector reform strategy should be initiated on a time bound basis.

1 Introduction

Background of the study

Due to increased urbanization, population growth, rising incomes etc., the demand for water in India is rapidly increasing. Its use, however, remains inefficient, although it is becoming scarcer day by day. Water supply in urban India is both inadequate and inefficient despite universal acknowledgement of water as a fundamental requirement of life. About 18 percent of the urban population does not have access to safe drinking water. Only 58 percent of urban households have access to drinking water on the premises. Compared to the minimum acceptable availability level of 40 litres per capita per day (lpcd), current availability is only 27 lpcd (Ministry of Finance 1996) — caused not only due to the inefficient end use of water but also on account of enormous distribution losses. Other problems associated with water supply are the presence of impurities in the supply of drinking water and the water supply being largely unmetered.

Augmentation of water supply and improvements in water quality call for significant investments. The Rakesh Mohan Committee estimates the magnitude of investment to be of the order of Rs 860.2 billion in the period 1996 to 2006 in India's urban areas. The Planning Commission estimates that Rs 200.7 billion would be required during the Ninth Five-Year Plan (1997–2002). As in other core infrastructure sectors, the state cannot finance all such development activities on its own. Thus, private investment would be required to augment the efforts of the state in this key sector. This has been recognized in Gujarat as well — the state that is the focus of this study.

The peculiarity of the water sector in terms of being one of the basic minimum services, makes private participation in this sector particularly complex. First, since water is essential to life, its availability to the economically disadvantaged groups at low delivery prices has to be ensured. Thus, the universal service obligation in this sector is much stronger than say in the telecom sector, and this has implications for tariff determination and levels of subsidy. Second, the health and sanitation aspects associated with water-supply services are important, and these cannot be left to private operators without appropriate regulation. Third, unlike in other sectors, the predominant cost in water supply is the cost of transmission and distribution, and not the cost of production or storage. As the scope for competition in distribution services is limited, this segment is also characterized by a strong element of monopoly. Fourth, as most of the distribution system is buried, information on the network, necessary to facilitate investment decisions, is not easily available.

Private investment in the water sector would also imply efficiency improvements with the introduction of managerial and technical expertise. It could be achieved through different options reflecting varying degrees of private sector participation. However, any attempt to introduce such participation would have to address many complex issues to satisfy both the consumers and the investors in the liberalised environment. There is a need for a fine balancing act to secure the financial viability of the industry on the one hand and protect the interests of consumers on the other. Also, as the scope of competition in water supply services is limited, there is a need to ensure that the utilities do not exploit their monopoly power at the expense of the consumers.

The bulk consuming segments in Gujarat's water sector are all areas under Municipal Corporations, smaller urban centres, rural areas, irrigation requirements and industrial consumers. It is expected that all the segments would significantly depend on bulk supply schemes, such as the Narmada Main- Canal based schemes and the Kalpasar project.

The need to protect the interests of various consumers in a natural monopoly situation, to ensure future growth in water sector in view of increasing population, rising income, economic growth and urban pressure to provide autonomy to various entities working in water sector, focus on providing incentives for sustainable water use, including conservation of water resources and protection of environment and, finally, to promote economic efficiency were recognised in Gujarat. Thus, the Government of Gujarat decided to develop an enabling framework to meet these objectives. The GIDB (Gujarat Infrastructure Development Board), Government of Gujarat has assigned the task to TERI (Tata Energy Research Institute), New Delhi.

Scope of the study

Against the above background, the scope of the study is as follows.

- To identify and suggest changes in the provisions, if any, in the existing legislations to facilitate the privatisation of the water sector
- To develop an enabling regulatory framework to facilitate private sector involvement in the water sector
- To identify changes in the existing legislations in order to facilitate the enabling regulatory framework
- To suggest measures to promote competition in the water sector
- To develop a policy framework for tariff-regulation
- To develop a framework that will protect consumer interests while ensuring private sector participation in the water sector

Study approach

In order to meet the objectives, the methodology adopted is as follows.

An extensive survey of literature on privatization of the water supply sector and the issues involved therein

- A review of the current regulatory framework for water supply in Gujarat, including the laws governing municipal administration, the legal provisions and the rules and regulations for water supply
- Extensive discussions with experts in the water sector, and stakeholders associated with water services in Gujarat
- A review of the privatization experience of other urban centres–both domestic and international
- Study tours to other urban centres like Chennai and Bangalore to facilitate a better understanding of the organizational dynamics of urban services, especially water supply services

Structure of the report

The second chapter reviews the water sector in Gujarat including an overview of the water-resource situation and the institutional structure of the water sector in the state. Chapter 3 analyses lessons drawn from national and international experience in the privatization and regulation of the water sector. Chapter 4 investigates the scope of private sector participation in all the segments of water supply and related services. The legal impediments to private sector participation are identified in Chapter 5. The enabling regulatory framework, to facilitate investment and to promote efficiency and economy in the sector, is presented in Chapter 6. This chapter elaborates the need for a regulatory framework and the issues involved in the design of a regulatory authority. It details the regulatory functions and the need for regulatory independence, apart from delineating the powers of the regulator. Chapter 7 provides a framework for tariff regulation while Chapter 8 provides a framework for setting water quality standards. Chapter 9 enumerates legislative changes to remove impediments and to facilitate the regulatory framework. Finally, Chapter 10, lays down the agenda for action.

2 A review of the water sector in Gujarat

Gujarat is situated on the west coast of India, between latitude 20°2′ and 24°N and longitude 68°8′ and 74°23′ E. The geographical area of the state is about 196 000 square kilometre or 19.6 million hectares. The coastline extends from Lakhpat in the north to Daman in the south. About two thirds of the total area is covered by rocky formations, while the remaining area is covered by alluvial deposits. Gujarat adjoins Rajasthan in the north, Madhya Pradesh in the east and Maharashtra in the south. For administrative purposes, Gujarat is divided into 19 districts and 183 talukas.

Gujarat has a tropical monsoon climate. Annual rainfall ranges from less than 300 mm in the northwest to over 2000 mm in the southeast. Most of the rain (90-95 percent of the annual total) falls between June to September, when the southwest monsoon prevails. Saurashtra, Kutchh and the northern part of Gujarat are very often subject to drought.

According to the 1991 census, the total population of Gujarat was 42 million. It is the tenth most populous state in the country, with an estimated population of 44.9 million as on March 1998.

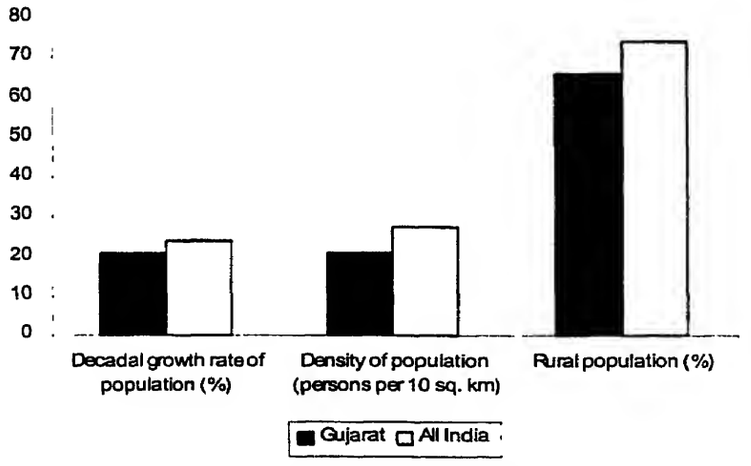

Figure 2.1 Population characteristics of Gujarat

Source CEPT (1997)

Among the major Indian States, Gujarat is the second most urbanized. Over 14 million people inhabit a network of 225 urban centres. According to the 1991 Census, 34.5

percent of its population lives in urban areas, compared to 25.7 percent for the country as a whole. It is estimated that by 2011 this will become 42.8 percent out of a total population of 51.7 million (CEPT 1997).

Table2.1 Number of towns in Gujarat

	1971	*1981*	*1991* [1]
Class I	8	13	28
Class II	17	23	25
Class III	37	46	51
Class IV	66	76	75
Class V	66	52	46

Source CEPT (1997)

Geographically, Gujarat divides naturally into three regions, namely (i) the mainland, covering the central and eastern part of the state; (ii) the Saurashtra peninsular region; and (iii) the Kutchh region, covering mostly the arid land of northern Gujarat. About two thirds of the total area is covered by rocky formations, while the remaining area is covered by alluvial formation.

Overview of the water sector in Gujarat

Water resources in Gujarat are concentrated primarily in the southern and central part of the mainland. Major rivers from neighbouring states enter through the eastern fringe. However, there are only three perennial rivers flowing through Gujarat viz., Narmada, Tapi and Mahi, all of which are located in south Gujarat. A major non-perennial river, Sabarmati flows through the districts of Sabarkantha, Mehsana and Ahmedabad.

Gujarat can be divided into four independent divisions for the purposes of classifying water resource availability. While 11 rivers flow in South Gujarat, 71 rivers flow in Saurashtra, 97 rivers in Kutchh, and 6 rivers in North Gujarat. About 47 percent of the available water resources of Gujarat are available from these rivers. Through these rivers, about 80 percent of the run-off generated from rainfall during the monsoon flows into the Arabian Sea.

The distribution of the water resources in the state is not equitable. While 60 percent of the total water resources exist in the south Gujarat, only 12 percent are in Saurashtra,

[1] Out of these 28 Class I towns, six are Municipal Corporations

7 percent in Kutchh, and 21 percent in the north Gujarat region. North Gujarat, Saurashtra, and Kutchh, thus suffer from acute water scarcity every two to three years. Due to the unequal development of water resources, some areas face water logging while in the others, there is an acute shortage of drinking water supply and irrigation for supporting life. The state has faced at least three drought years in the last 10 years. The worst affected regions are districts in Saurashtra and Kutchh, which neither have a perennial river, nor any sustainable ground water source.

Table 2.2 Distribution of water resources in Gujarat[2]

	South Gujarat	Saurashtra	Kutchh	North Gujarat	Total
Number of districts	7	6	1	5	19
Area (sq km)	47 557	64 337	45 612	38 478	195 984
	(24.27)	(32.83)	(23.27)	(19.63)	
Rainfall (mm)	1448	105	45	594	
Number of rivers	11	71	97	6	185
Surface water (mcm per year)					
Available	17510	4550	2430	7940	32430
Utilizable	13 900	1500	400	2000	17 800
Groundwater (mcm per year)					
Available	8000	6620	810	5000	20 430
Utilizable	6800	5625	689	4250	17 364

Source Hiraway (1999)

It has been estimated that this imbalance in water resources would continue in the future. This is displayed in Figure 2.2.

[2] Figures in parenthesis indicate percentages of the total

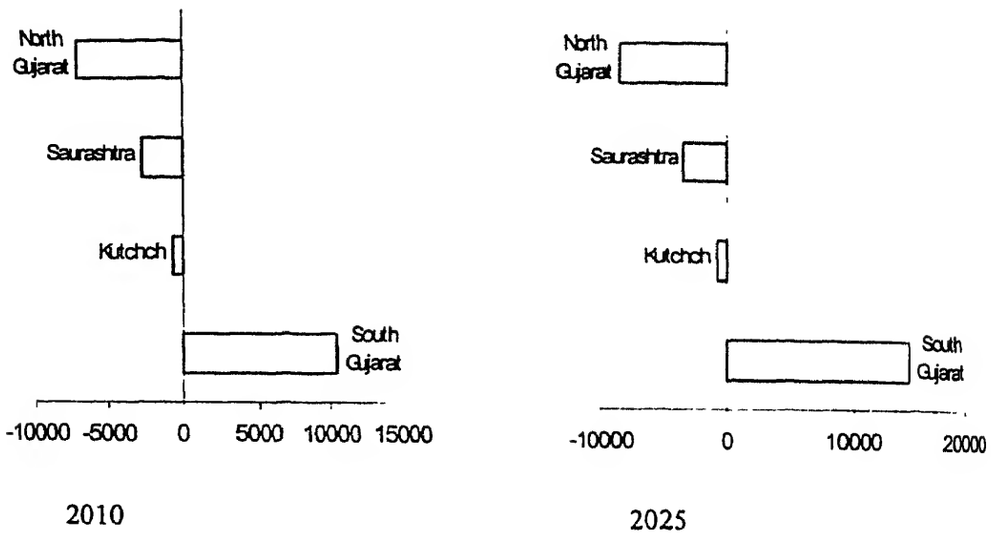

Figure 2.2 Surplus (deficit) of water resources in Gujarat (mcm per year)

Source Tahal (1997)

Apart from the inequitable distribution of water resources, the coastal regions also face problems due to the ingress of sea water due to limestone quarrying–largely restricted to the Saurashtra and Kutchh regions. The rainfall pattern in the state is also erratic, and this has made certain areas of the state extremely susceptible to drought and famine conditions. This is exacerbated by the very specific and peculiar geological and geo-hydrological situation–rocky terrain, desert region, and deteriorating ground water quality.

Water resources in Gujarat

The availability and requirements of water resources by the year 2010 and 2025 given in Table 2.3 have been estimated by Tahal (1997). With the available quantum of water resources, it is estimated that an area of 5.9 million hectares of land can be brought under irrigated agriculture and at the same time drinking water supply for a population of 51.7 million can also be provided by 2010. In 2025, an area of 6.5 million hectares can be provided with irrigation and 58.7 million people with drinking water. The requirement of water for industrial use is estimated assuming industrial demand as 12–15 percent of the requirement for domestic use.

Table 2.3 Details of requirement and availability of water resources in the river basins of Gujarat by 2010 and 2025 (mcm per year)

River basin	*2010*	*2025*	River basin	*2010*	*2025*
North Gujarat			**South Gujarat**		
Rel	-41	-50	Mahi	1604	1239
Banas	-644	-797	Dhadhar	-882	1017
Saraswati	-425	-512	Narmada	9656	10558
Rupen	-524	-632	Kim	-253	-292
Sabarmati	-3154	-3838	Tapi	1294	2960
Remaining river basins of north Gujarat	-2222	-2579	Mindhola	-315	-378
Saurashtra area			Punma	-235	-17
Shetrunji	0	0	Ambika	-364	-374
Bhadhar	0	0	Auranga	-106	0
South Saurashtra	0	0	Par	-104	-82
North western Saurashtra	0	0	Kolak	-84	-103
North and north eastern Saurashtra	-1976	-2503	Damanganga	188	185
Eastern Saurashtra	-702	-906	**Kutchh area**		
			Kutchh	-690	-859

Source Tahal (1997)

Surface water

Gujarat has given priority to the construction and development of surface water reservoirs in the form of major, medium and minor irrigation schemes so as to tap the rivers and impound water for use in irrigation as well as drinking water.

The surface water potential of Gujarat has been evaluated at 20 486 mcm per year at 75 percent dependability in Gujarat, 60 percent in Saurashtra, and 50 percent in Kutchh. An additional volume of 18 047 mcm per year has been allocated to Gujarat by interstate agreements, mainly with Rajasthan and Madhya Pradesh.

It should be emphasized that utilizable surface water, which is generally lower than the water potential, is determined by the existence of surface water schemes, including dams and reservoirs, their technical features and storage capacity, sedimentation, programme of operation and water losses (by evaporation and seepage in reservoirs).

Most of the reservoirs in Saurashtra and Kutchh are rainfed. Thus, Saurashtra and Kutchh have been significantly dependent on monsoons. The performance of rain-fed reservoirs in this region varies from year to year depending upon the rainfall performance. During the drought years, most of these reservoirs were empty and as a

result emergency pipelines have been laid to provide water to rural and urban areas in Saurashtra.

Groundwater

Groundwater condition in Gujarat varies in relation to the hydrological setting. At present, a substantial quantity of ground water is being extracted to support irrigation, industry and drinking water requirements. As of 1991, there were 32 560 wells in Gujarat, of which 28 411 were private tube wells and 4149 government / Gujarat Water Resources Development Corporation tubewells. During the same year, the groundwater exploitation was 10 416 mcm.

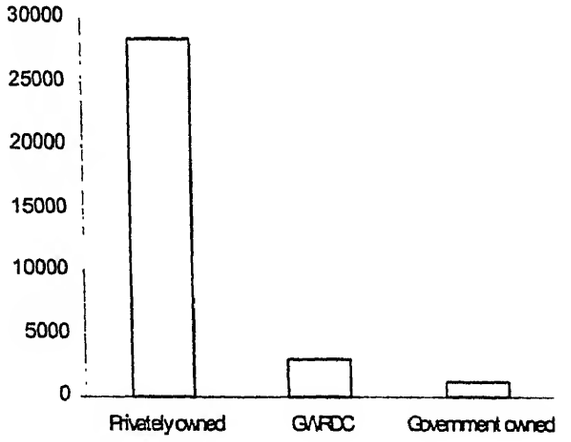

Figure 2.3 Number of tubewells in Gujarat

Source Hiraway (1999)

As per the Ground Water Resources Estimation of 1997, 31 talukas of Gujarat fall in the over exploited (OE) category, eight talukas in the dark category, and 42 talukas in grey category. As ground water exploitation is more than the recharge, depletion in water levels of three to five meters occurs every year. This has resulted in a reduction in yields from the tubewells. There is also a general deterioration the quality of ground water.

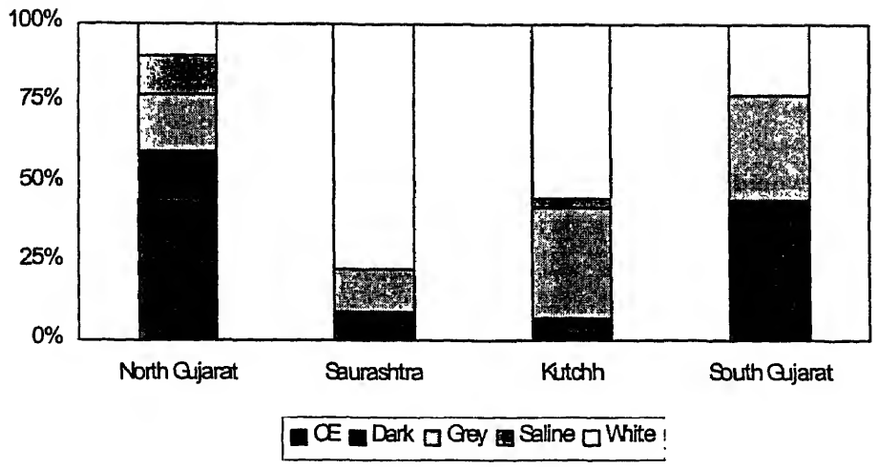

Figure 2.4 Groundwater exploitation in Gujarat

Source Hiraway (1999)

The natural replenishment has been estimated at 10 862 mcm per year and the net available groundwater at 11 176 mcm per year. In the future, as a result of the development of irrigation in new areas, the return flows are expected to increase, and therefore, the groundwater potential and availability will increase.

Demand-supply scenario in Gujarat

This section is based on the demand–supply scenario prepared by Tahal Consulting Engineers Ltd., Israel in their study of water resources in the State and reproduced in GIDB (1999). The water balance in 2010 is presented in Table 2.4.

Table 2.4 Water balance in the year 2010

Resources	Mcm per year	Percentage of total supply
Supply		
Ground water - Existing exploitation (1991)	10416	20.41
Surface water - Existing exploitation (1991)	9019	17.67
Total	19435	38.08
Regulation and artificial recharge	6180	12.11
Recycling of sewerage water	710	1.39
Total	6890	13.50
Ground water - Ongoing and proposed schemes (Till 2010)	10524	20.62
Surface water - Ongoing and proposed schemes (Till 2010)	14191	27.80
Total	24715	48.42
Total supply	51040	
Demand		
Domestic and Industrial use	2010	3.94

Irrigation	49030	96.06
Total demand	51040	

Source Tahal (1997)

As can be seen from the above table, the share of groundwater in the total supply is projected to decrease from over 53 percent to about 41 percent. The share of surface water would also reduce marginally from the current 46 percent to 45 percent. This shift can be attributed to the growing importance of conservation activities which are estimated to account for well over 13 percent of the total water supply. Thus, the current scenario is likely to change because of rapid depletion of ground water levels and consequently higher dependence and usage of indirect sources in the future.

Projects in the pipeline till 2010

Despite initiating conservation activities to meet the growing demand, the state would continue to depend heavily on new surface water schemes (primarily the Sardar Sarovar Nigam Project). Some of these schemes, identified in GIDB 1999 are listed in Table 2.5.

Table 2.5 Major bulk water supply projects in the state (excluding projects in urban areas)

Project	Implementing Agency	Area	Investment (Rs million)
Sardar Sarovar Canal based Drinking water supply scheme	GSDWICL	8215 villages and 135 towns of Saurashtra, Kutchh and North Gujarat	47 000
Narmada based Mahi Pipeline Project	GSDWICL	Bhavnagar and Amreli districts	5500
Gulf of Khambat: Kalpasar Development Project	Proposal to float an SPV for this purpose	Saurashtra	34 9610 including power works

Source GIDB (1999)

Demand-supply scenario in urban centres

Tahal (1997) has estimated the demand for drinking water in urban centres in Gujarat assuming a demand of water of 140 lpcd in towns with a population more than 50 000, and 100 lpcd in all other towns. The urban population in the state was assumed to grow at a rate of 15 percent in 2001–2011, 12 percent in 2011–2021, and 4.8 percent in 2021–2025. The estimates are given in Figure 2.5.

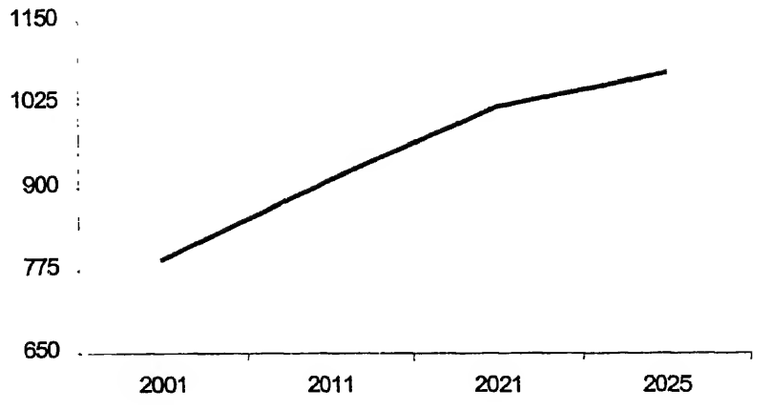

Figure 2.5 Demand for drinking water in urban Gujarat (mcm per year)

Source Tahal (1997)

GIDB (1999) also analyzed the demand and supply scenario for the six Municipal Corporations in the state in detail, and based on the demand-supply gap, estimated the investment requirement. These estimates were prepared assuming a norm of 160 lpcd. The demand-supply gap has been presented in Table 2.6. The gap shown in Table 2.6 has been calculated on a cumulative basis assuming no capacity addition in the previous years.

Table 2.6 Demand-supply gap for Municipal Corporations in Gujarat

Year	Ahmedabad	Surat					Total
		Vadodara		Jamnagar	Rajkot	Bhavnagar	
Demand supply gap (mld) assuming no capacity addition							
1998	190.84	-57.43[3]	141.70	7.33	37.20	15.26	334.91
2001	252.44	-36.46	173.90	14.43	49.37	22.83	476.49
2004	319.84	-13.52	209.12	22.19	62.69	31.10	631.42
2007	393.59	11.59	247.66	30.69	77.26	40.15	800.94
2010	474.28	39.06	289.84	39.98	93.21	50.06	986.43

Source GIDB (1999)

[3] Figures with a negative sign indicate a surplus capacity based on the supply norm of 160 lpcd.

As Table 2.6 shows, the demand-supply gap is expected to grow by nearly 300 percent if supply is not augmented. This is especially true for Ahmedabad and Surat.

The cost of provision and distribution of the above estimated additional water supply has been estimated at Rs 8607 million (GIDB 1999). This figure was arrived at assuming a cost of provision as Rs 7922 thousand per mld and the distribution of water has been calculated based on a norm of Rs 200 per capita. The investment requirements presented in Table 2.7 have been calculated on the basis of an assumption that no capacity addition takes place in the previous years.

Table 2.7 Investment required in water sector in Municipal Corporations (Rs million)

Year	Surat						Total
	Ahmedabad	Vadodara		Jamnagar	Rajkot	Bhavnagar	
Cumulative investment to augment supply							
2001	1994.2		1373.8	114	390	180.3	3764.3
2004	2526.7		1652	175.3	495.3	245.7	4988.2
2007	3109.3	91.6	1956.5	242.4	610.4	317.2	6327.4
2010	3746.8	308.6	2289.7	315.9	736.4	395.5	7792.8
Cumulative investment to augment distribution network							
2001	77.00	26.20	40.20	8.90	15.20	9.50	177.00
2004	161.20	54.90	84.30	18.60	31.90	19.80	370.60
2007	253.40	86.30	132.40	29.20	50.10	31.10	582.50
2010	354.30	120.60	185.20	40.80	70.00	43.50	814.40

Source GIDB (1999)

Institutional structure of the water sector

As per the Constitution of India, the primary responsibility of water supply rests with the states. The Central government influences the sector through approvals of state development plans and provides assistance through a number of Central government agencies like the Central Groundwater Commission.

Within the framework set by the Central government, the State Governments determine the policies for the water sector and influence sector developments through the processes of regulation of sector agencies and resource allocations from State budgets. It is not uncommon for State governments to have established special purpose entities to provide the planning, design and construction of water supply and sanitation infrastructure. At the local level, the municipalities are the primary local bodies responsible for providing water supply in larger cities and urban areas of India.

In Gujarat, as in other states, the water sector is managed by institutions at different levels. The Department of Narmada, Water Resources, and Water Supply is the key

State-level government department. Each of the three wings of this department, that is, Narmada, Water Resources and Water Supply, is headed by a Secretary to the State government. This institution is responsible for formulating the drinking water policy, preparing annual and five-year plans for development of the sector, allocating funds to the implementing agencies, and guiding sectoral development. The Gujarat Water Supply and Sewerage Board (GWSSB) is the State level autonomous organisation responsible for development and regulation of drinking water supply and sanitation services in the State (except for the cities and cantonment areas). Also, since Gujarat is a water scarce state, the strategy in the water sector has been to develop new schemes. Thus, some Special Purpose Vehicles (SPVs) have been set up in the State for executing and managing large projects. The key SPVs are the Sardar Sarovar Narmada Nigam Limited (SSNNL) and the Gujarat State Drinking Water Infrastructure Company Limited (GSDWICL).

The institutional structure of the water sector in the state is given in detail in Table 2.8 and Figure 2.6.

Table 2.8 Institutional structure of the water sector in Gujarat

Agency	Jurisdiction	Role
Administration and regulation		
Department of Narmada, Water Resources, & Water Supplies	State level	▪ Regulatory oversight of the water sector in the State ▪ Oversight of State government owned corporations involved in the implementation and operation of water schemes
Department of Urban Development	State level	▪ Oversight of urban local bodies, excluding corporations, in matters of financial, planning, and management issues ▪ Regulation of political and administrative appointments in the local authorities
Municipal Corporations	Major cities	▪ Provision of retail water supply services for domestic and industrial purposes in the area of their jurisdiction
Municipalities & Nagar Palikas	Smaller cities	▪ Provision of retail water supply services for domestic and industrial purposes in the area of their jurisdiction

Agency	Jurisdiction	Role
Gram Panchayats	Villages	▪ Provision of retail water supply services for domestic and industrial purposes in the area of their jurisdiction
Gujarat Industrial Development Corporation	State level	▪ Provision of retail water supply services in industrial estates owned by GIDC
Implementation and operation		
Gujarat Water Supply and Sewerage Board (GWSSB)	State level	▪ Mainly implementing water supply and sewerage schemes for urban local bodies ▪ Operation of some schemes ▪ Inspection of schemes where State government funding is provided
Gujarat State Drinking Water Company Limited		▪ Bulk transmission and bulk supply of drinking water to local bodies, GWSSB, and industrial estates
Sardar Sarovar Narmada Nigam Ltd	State level	▪ Wholesale supply of water
Department of Narmada, Water Resources, and Water Supplies	State level	▪ Operation and maintenance of some river schemes like the Ukai Dam

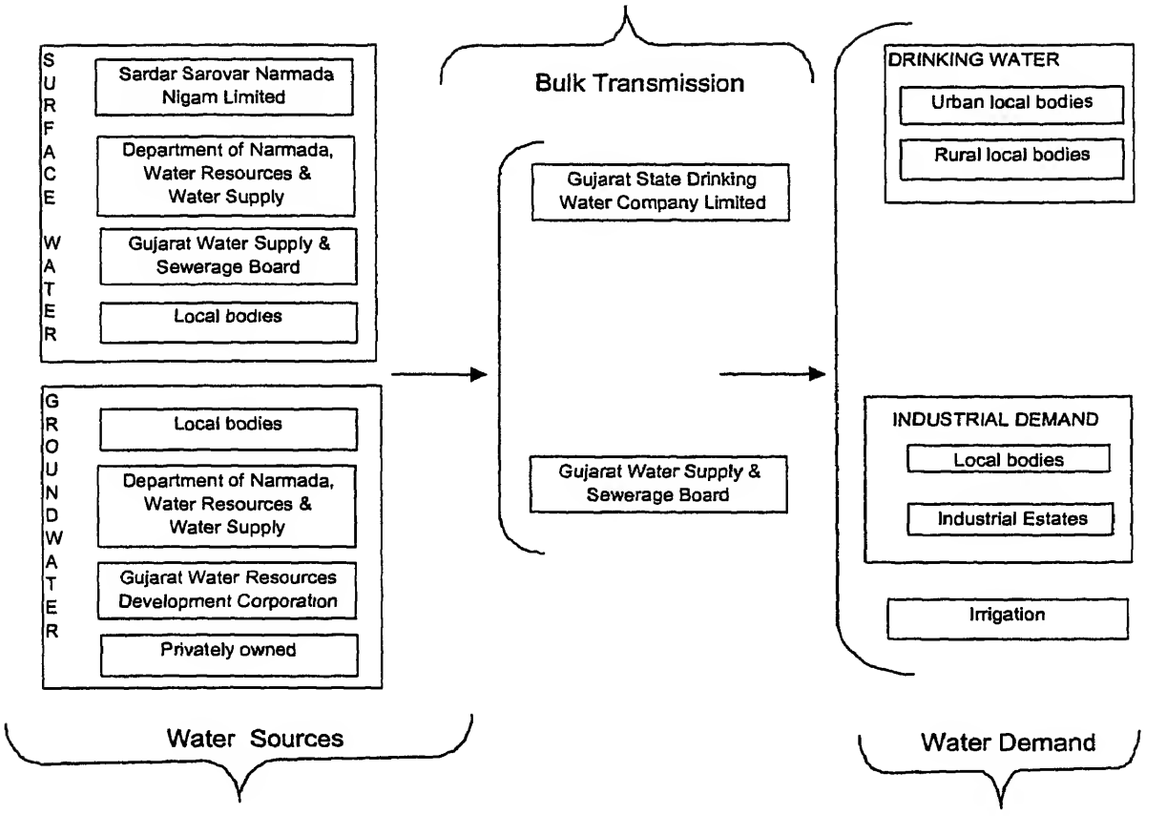

Figure 2.6 Structure of the water sector in Gujarat

A brief description of the various agencies in this sector in Gujarat is given below. Of these the three state level agencies responsible for the implementation and operational activities in the state, that is GWSSB, GSDWICL, and SSNNL are under the Department of Narmada, Water Resources and Water Supplies, Government of Gujarat.

- **Municipal Corporations:** Municipal Corporations for the cities of Ahmedabad, Vadodara, Surat, Rajkot, Jamnagar and Bhavnagar are governed by the Bombay Municipal Corporation Act 1949 (BPMC Act). Under the provisions of the BPMC Act, these corporations provide the civic services in their respective cities[4]. This includes provision of water. This was the case even before the enactment of the 74

[4] Under Section 63, it is the obligatory function of the corporation *to make reasonable and adequate provision by any means or measures which it is lawfully competent for it to use* or to take *the management and maintenance of all municipal water works and the construction or acquisition of new works for a sufficient supply of water for public and private purposes.*

Constitutional Amendment. Under the BPMC Act, Corporations have wide ranging powers to ensure water quality and can set water tariffs independently. The tariff for the provision of water services is being collected in a number of ways by the corporations. This is being either collected as a part of the property tax (Section 129[a]), or as a water charge on the volume of water supplied, or on the basis of the size of the connection (Section 134). It must be noted that if the tariff is collected as a part of the property tax or the size of the connection, as is mostly the case, there is no relationship between the tariff that is charged and the consumption of water.

Detailed case studies of two corporations in Ahmedabad and Rajkot, are given in Annex A and Annex D.

- **Other local bodies:** The operational management of drinking water services in the urban sector is the responsibility of the urban area local bodies; rural water supply schemes covering more than one village (comprehensive) are run and maintained by GWSSB. Individual village panchayats are responsible for the operation and maintenance of village water supply schemes.
- **Gujarat Water Supply and Sewage Board:** GWSSB has been constituted as a corporate body under the Gujarat Act No. 18 of 1979 (GWSSB Act) for the rapid development and the proper regulation of water supply and sewerage services. Its jurisdiction extends to the whole State of Gujarat, excluding cities, that is municipal corporations and cantonments. GWSSB acts as the nodal agency responsible for implementing bulk drinking water supply schemes in urban and rural areas.

  The GWSSB Act envisaged that the board would operate as the nodal agency for all water supply and sewerage projects in the state. Additionally, the Act also envisaged a planning and regulatory role for the board. For instance, section 14(c) requires the board to prepare draft state plans for water supply, sewerage, and drainage, on the directions of the government. Moreover, the board is to review and advise on the tariff, taxes, fees, and charges of water supply and sewerage systems, in the areas comprised within the sphere of operation of the board (Section 14[d]). Also, the board is required *to establish the state standards for water supply*. For this purpose, the board was given wide powers such as *to approve tariffs for water supply and sewerage applicable to areas comprised within the sphere of operation of such services of the board*. Also the board can *abstract water from any natural source*. Interestingly, the board can *enter into contract or agreement with any person... for performing its duties and discharging its functions* (Section 15[2][f]). Thus, there is ample scope for the board to initiate private participation in the sector.

- **Sardar Sarovar Narmada Nigam Ltd:** There are surplus water resources in the Narmada, Mahi, Damanganga and Tapi river basin areas. Therefore, diverting

surplus water resources from these river basins to other water scarce areas has been recognized as a key strategy in the state. For achieving this, Sardar Sarovar Project of the Narmada Canal has been developed as a state carrier of water from water abundant to water scarce areas in the state. A SPV, the SSNNL (Sardar Sarovar Narmada Nigam Ltd.) has been set up. The salient features of Sardar Sarovar Project are given in Table 2.9.

Table 2.9 Salient features of Sardar Sarovar Dam

Main Dam	
Length of the main concrete gravity dam	1210.00 mm
Maximum height above deepest foundation level	163.00 m
Catchment area of the rive above dam site	88,000 sq. km
Gross storage capacity (7.7 MAF)	9497.07 mcm
Live storage capacity (4.75 MAF)	5859.80 mcm
Length of reservoir	214.00 km
Maximum width	16.10 km
Average width	1.77 km
Main canal	
Length up to Gujarat-Rajasthan border	458 km
Length in Rajasthan State	74 km
Design discharge capacity	
In head reach	40 000 cusecs
At Gujarat-Rajasthan border	2500 cusecs
Distribution system	
No. of branches (Gujarat)	42
Length of distribution system network	6600 km
Annual irrigation	
Gujarat	1.80 million hectares
Rajasthan	0.075 million hectares

- **Gujarat State Drinking Water Infrastructure Company Limited:** For implementation of the Sardar Sarovar Canal-based drinking water supply project, the state government has set up a SPV–SSNNL (Sardar Sarovar Narmada Nigam Ltd.) a state owned corporation. This would be the bulk supplier of Narmada water through its canal network, including the supply of drinking water. This water would then be purchased and transmitted by the Gujarat State Drinking Water

Infrastructure Company Ltd. The bulk purchasers of this water would be local authorities like municipal corporations and municipalities, GWSSB and industrial estates. Furthermore, GSDWICL is authorized to purchase water from any agency, in addition to the SSNNL. The company would thus operate as a *bulk carrier* of drinking water in the State. GSDWICL has already been incorporated by the State government as a SPV for the laying down and subsequent management of 2500 km-long drinking water trunk transmission mains.

The state of the water system

The increasing water demand in Gujarat, stemming from the population growth and from enhanced economic development, must be met from the diminishing water resources. To combat the water scarcity problem, the State government has given top priority to the construction of water resources schemes based on surface water and tubewells. However, due to the topography, multipurpose and major projects are feasible only in the eastern and southern regions of the State. Thus, appropriate water resources development and management, and water management strategies are required to alleviate the uneven spatial and temporal distribution of the natural water resources in order to sustain economic development.

Most water service providers in Gujarat are not financially viable, and have to depend heavily on government subsidies. Sometimes, the existing law encourages a service provider to run contrary to basic financial principles. For instance, Section 35 of the Gujarat Act No. 18 of 1979 stipulates that 'the Gujarat Water Supply and Sewerage Board shall not, as far as practical and after taking credit for any grant or subvention from the State Government carry on its operation under this Act at a loss'. This implicitly implies that the Board is not required to earn a profit.

There is also no incentive amongst various players to initiate change in the existing unsustainable water management system. Since the accountability of service providers to its users is low, they have little incentive to provide cost effective water supply services, to become financially self sufficient, to improve quality of services and to consult various user organisations for better services. At the same time, the users have little incentive to pursue reforms in the water sector since most of them are highly subsidized. Political groups are reluctant to antagonise these users due to obvious compulsions.

As the provision of irrigation water, drinking water supply and electricity are dependent on water resources, there is an acute need to plan the development and utilization of water to promote overall development in the State. In addition to proper planning of water resources management, the distribution of intra-state water resources and optimum utilization of water resources are equally important.

The water sector in Gujarat, especially in many urban areas, is characterized by a *low level equilibrium*, that is, there is a vicious cycle arising out of the interrelated factors such as poor finances, poor institutions, poor infrastructure, poor service and consumer dissatisfaction. Since consumers are dissatisfied with the poor services of water service providers, there is low willingness to pay. As a result, revenue collections are poor leading to inadequate generation of capital resources. This is also compounded by inadequate information systems in the sector. Inadequate resources also lead to a fragmented institutional structure as well as ineffective management practices. Also, as the focus in the water sector is largely on the construction of new water supply schemes, adequate management skills have not developed. This has led to the inadequate provision of services in the water sector which again leads to consumer dissatisfaction. Although a need to break the vicious cycle has been recognized in Gujarat, a lot of effort is needed to tackle these complex issues.

Table 2.10 shows the status of the water sector in Ahmedabad and Rajkot. As mentioned earlier, there is a substantial gap in the demand and supply. The universal service obligation is also not being met in large parts of the State. The consumption of water that is charged for on a volumetric basis, forms a negligible proportion of the total consumption. Finally, the collection of revenue from the water sector falls considerably short of even the operating and maintenance costs of the water supply. Thus there is a large shortfall in resources available for the development of this sector.

Table 2.10 Overview of the water sector in Ahmedabad and Rajkot (1999/2000)

	Ahmedabad	Rajkot
Surplus (deficit) in water supply (mld)	-252	-50
Availability of water (lpcd)	152	110
Availability of water (no of hours daily)	2½	½[5]
Accessibility of water (% of the municipal area covered)	80.00	66.67
Extent of metering (% of the total number of connections)	4.12	0.38
Cost of water supply (Rs per 1000 litres)[6]	2.70	4.30
Collection of water tariff (Rs per 1000 litres)	1.60	1.00
Subsidy to the water sector (Rs per 1000 litres)	1.10	3.30

[5] This has fallen to ½ hour every alternate day

[6] Includes only operating and maintenance costs

Conclusion

- Water resource distribution in Gujarat fails to cross all geo-hydrological zones. While south Gujarat has abundant water resources, north Gujarat, Saurashtra and Kutchh are water deficient areas. As a result, there is significant over exploitation of groundwater in the water deficient areas.
- The proportion of groundwater in the total supply is projected to decrease in the future as large surface water schemes are commissioned, notably the Sardar Sarovar based Narmada Main Canal. Even after accounting for the groundwater and surface water availability, there would be a significant shortfall in supply. This is proposed to be met by water conservation and recycling activities.
- The shortfall in urban areas is even more critical and requires substantial investments in developing new sources of water. Investments are also required to rehabilitate the existing distribution network.
- The State has a complex institutional structure with multiple agencies and overlapping jurisdictions. A new phenomenon that has been observed in the state is the emergence of a number of SPVs in the water sector for the execution and operation of specific projects, principally those linked with the Sardar Sarovar project.

3 Private sector participation in India and other countries

Rationale for PSP (private sector participation)

Water supply in urban Gujarat is inadequate and inefficient despite universal acknowledgement of water as a fundamental requirement of life. As mentioned in Chapter 2, the causes identified for such a dismal scenario are a complex institutional structure in the sector leading to a diffusion of responsibilities and enormous lag in investments leading to inefficient supply. Augmentation of water supply and improvements in water quality call for significant investments. GIDB estimates that the magnitude of investment to augment supply in the six Municipal Corporations would be of the order of over Rs 8.60 billion in the period 1998 to 2010.

It is becoming increasingly difficult to meet the existing demand for better water supply and sanitation services, and to expand as well as to improve the same due to growing urban pressure, population growth, and economic growth. Public utilities are unable to meet such demand due to various reasons. Urban water supply and sanitation systems, in many countries including India, face very complex problems: existence of financially non-viable water utilities, water tariffs below cost recovery levels, poor quality of service, poor institutional structure, poor governance, and limited access to additional resources of capital. Obviously, the state cannot finance all such developmental activities on its own. Thus private investment would be required to augment the efforts of the state in this key sector. In this situation, many governments are looking for private sector participation, which could bring additional resources, provide technical and management expertise, and bring about operational efficiencies in the water sector.

Modes for private sector participation options

The private sector participation option in a segmented fashion can take different forms. The water cycle can either be unbundled and opened in a segmented fashion to private sector participation, or the entire water cycle can be opened to such process. These options are discussed below.

Service contracts

This type of contract requires a private operator to perform certain specific tasks such as billing and collection, meter reading, monitoring loss, repairing pipes, etc. The maximum duration of the contract could be, say, five years. By using this option, it is possible to take advantage of private sector expertise for performing technical tasks or even to open such tasks to competition. The public utility manager, under this option, has the responsibility for coordinating the tasks being performed by private operators, and the responsibility for investment would lie with the public utility manager. It is not possible to bring management expertise, improve operating efficiency and bring additional investment under this option.

BOT, BOOT, ROM

In a typical BOT (built-operate-transfer) option, a private operator would be required to perform specific tasks, maintain the same for a certain period, and at the end of the period, relinquish all rights to the public utility. The private operator would get the price calculated over the life of the contract to cover its construction and operating costs along with a reasonable rate of return. The period of this kind of contracts varies between approximately 10 to 30 years. A related concept is ROM (rehabilitate, operate and maintain) wherein the private operator provides necessary investment for rehabilitating the water system, and sells its services to a public utility manager according to the terms and conditions of the contract. This option allows the bringing in of management expertise to some extent (Table 3.1). Commercial risk as well as investment risk remains the burden of the private operator.

Management contract

This option transfers the responsibility for the operation and maintenance of the existing system to a private operator. The public utility is responsible for rehabilitation and new investment. The contract lasts for a period between three to five years approximately. The private operator receives a fixed fee or fees, which could be related to various performance parameters. This option could bring technical and management expertise to the sector and to some extent improve operating efficiency, while generally there would be no investment in the bulk or investment in the distribution segment of the water system. The commercial risk as well as the investment risk remains with the public utility.

Lease contract

It typically lasts for 10 to 20 years. Under this option, a private firm leases assets of the public utility and takes on the responsibility for operating and maintaining them. The operator may pay the public utility a fee for use of assets and will not have the responsibility of financing new investment, which will lie with the public utility. This contract could bring in technical expertise, managerial expertise and operating efficiency to the sector. While investment risk lies with the public utility, the commercial risk is shared between the private operator and the public utility.

Concession contract

A concession agreement or franchise is a means of awarding fixed term monopoly rights to provide a service to a private firm within a geographical area. Under this option, a private operator not only has the responsibility for the operation and maintenance of the existing assets but also for new investments. He has rights over the full use of all assets, although their ownership lies with the government or with the public utility. The contract usually lasts for 25 to 30 years. The concession is governed by terms and conditions set through a contract, which outlines main performance targets (such as quality or coverage or both), arrangements for capital investments, performance standards, mechanisms for tariff adjustments, and arrangements for dispute resolution. This option could bring in technical expertise, managerial expertise, operating efficiency, and additional investment to the sector. The investment risks and commercial risks lie with the private operator.

Divestiture

This option, through the sale of assets or shares or through management buyout, can be partial or complete. It gives the private operator full responsibility for operation, management and investment. Unlike the concession, it transfers ownership of assets to the private sector.

Table3.1 Private sector participation and objectives

Options / Objectives	Service contract	Management contract	Lease	BOT	Concession
Technical expertise	Yes	Yes	Yes	Yes	Yes
Management expertise	No	Yes	Yes	Some	Yes
Operating efficiency	No	Some	Yes	Yes	Yes

Investment in bulk	No	No	No	Yes	Yes
Investment in distribution	no	No	no	No	Yes

In sum, depending on the PSP options, benefits would vary. The extent of variation of such benefits has been summarized in Table 3.1. Each country has to adopt its procedure and choose options depending on varied circumstances. In addition, the extent of stakeholders' support and necessary political commitments would determine the best possible option. Such details have been summarised in Table 3.2.

Table 3.2 Stakeholder support and political commitment under various private sector participation options

Option	Stakeholder's support and political commitment
Service contract	Low
Management contract	Low to medium levels needed
Lease	Moderate to high levels needed
BOT	Moderate to high levels
Concession	High levels
Divestiture	High levels

Source Cowen (1997)

Indian experience

There has been very little in terms of private sector participation initiatives in the water sector in India. Even the initiatives that have taken place, have been confined to discrete functions and to more primitive forms of PSP as in management and service contracts. However, the Tirupur project in Tamil Nadu is being developed on a BOOT model. In Karnataka also, the BOOT option is being explored for various activities in the water sector.

Management contracts

In Tamil Nadu

Sourcing of water in Chennai

In Chennai, the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB or Metro Water) has entrusted the operation and maintenance of 29 borewells in two aquifers, namely, Tamaraipakkam and Poondi, to a private contractor. The operating personnel are provided by the contractor. Also, the contractor is responsible for minor repairs. However, the power costs are met by Metro Water. It has been estimated that the cost saving for the Board from this arrangement is about 56 percent.

Treatment of water in Chennai

The operations and maintenance of one of the treatment plants, the water treatment plant at Redhills, has been entrusted to a private contractor. As per the existing arrangement, the operating personnel, supply of chemicals and minor repairs to equipment and meeting the prescribed water quality standards are the contractor's responsibility. The Board meets the power cost.

Reverse Osmosis Plants in Chennai

Metro Water had three small Reverse Osmosis Plants constructed by a private operator to supply water to the local community. These have also been given out to the same party for maintenance.

Proposals in the pipeline in Karnataka

To review and update the improvement plans for the water supply system in Bangalore, the Bangalore Water Supply and Sewerage Board (BWSSB) has initiated steps for a study with the support of eight million French Francs as aid. Two firms have been identified for this purpose, namely Vivendi and Lyonnaise dex Eaux. It is expected that once the above study is over, the Government of Karnataka would enter into management contract for five years with these two firms for different zones. The study is yet to be commenced.

Service contracts

Water sourcing in Chennai

One of the first efforts in involving the private sector on water sources can be traced back to the drought in 1987, in Tamil Nadu. At that time, excess water drawn by farmers in the surrounding areas was bought by the Chennai Metropolitan Water Supply and Sewerage Board or Metro Water. This was a short term proposal involving 12 wells which supplied about 3.3 mld to the city.

Transportation of water by tankers in Chennai

Water is transported through tankers for filling static water tanks. This transportation of water through tankers has been privatized in the following form. Tankers are taken on lease from the private sector. At present, 338 hired tankers perform an average of 2740 trips daily filling about 4290 tanks, and supplying a total quantity of 24.66 mld. The privatization of tanker operations is one of the earliest initiatives to involve the private sector, started about 13 years back and is still in operation. In fact, the cost quoted by the operators is being gradually reduced in spite of increase in inputs costs like diesel prices due to the intense competition in the sector. An average of 18.5 percent savings has been estimated through this initiative.

Build-Own-Operate-Transfer (BOOT)

Tirupur project in Tamil Nadu

Tirupur is a leading industrial township in India and has a strategic importance in the domestic cotton knitwear industry. From home-run cottage industry in the early 1960s, Tirupur has emerged as India's leading knitwear export centre. Despite its growth and unique position, the industry faces constraints in infrastructure. Water, an essential input to the bleaching and dyeing process, is in short supply. In addition, Tirupur lacks adequate roads, transhipment facilities, power, telecommunication and urban infrastructure facilities. The local knitwear industry made a representation to State government with regard to severe infrastructure bottlenecks in the region. The State government drafted out the Tirupur Area Development Program (TADP). While TADP covers a number of infrastructure areas, the first phase would essentially relate to water supply, wastewater and industrial effluent treatment. It was also recommended that a Special Purpose Vehicle (SPV) be set up to implement the project on a commercial basis. Accordingly, an SPV known as the New Tirupur Area Development Corporation Limited (NTADCL) has been formed. It has been promoted by the Central Government, the State Government, IL&FS (Infrastructure Leasing and Financial Services), and the local industrial association.

The project is being developed in a BOOT format, that is, NTADCL executes and operates the project during the concession period. The ownership of the project lies with NTADCL during the concession period. The project is an integrated water sector project and envisages the following activities.

- Establishment of bulk water supply system for abstraction and treatment of raw water from Cauveri river, and distribution to bulk industrial consumers, Tirupur Municipality (TM) and four villages enroute
- A water distribution system to store and distribute treated water to domestic and industrial consumers within the jurisdiction of TM

- A sewage collection, treatment and disposal system for the TM, including on-site sanitation facilities (for the slum areas)

The State government through Concession Agreement has agreed to introduce appropriate legislation, which would prohibit the extraction of ground water for non-domestic use for a minimum of 15 years from the commencement of services by the concessionaire. Further, the concessionaire would be given the right of first refusal for provision of like services within the concession area.

The concessionaire would be allowed to levy a composite water charge to supply to industrial units and on a bulk basis to the Tirupur Municipality and Tamil Nadu Water Supply and Drainage Board for wayside villages. The charge is set to recover a fixed rate of return on total investment over the concession period, initially set at 30 years. The concession assures a post tax rate of return of 20 percent on investment.[7] The concession would be terminated whenever the target rate of return is achieved.

Thus the concession provides an assured return to the project, thus allowing recovery of project investments through a regulated water tariff. There is also a provision to generate additional revenues through real estate development.

The details of this project are given in Volume II (Annex E) of the Report.

Proposals in the pipeline in Karnataka

BWSSB initiatives included private sector participation in sourcing water from the Cauveri river. Under the CWSS (Cauveri Water Supply Scheme) Stage IV- Phase II, a proposal to produce and convey water over a distance of 98 km from the city is being considered under the BOOT modes. Under the project, a private partner would lay a separate pipeline for bringing water to a treatment plant, pump and store the same at three stages, and finally bring water to distribution points in the city. A consortium headed by Biwater International has emerged as the preferred bidder in the competitive bidding process. A final decision on the project is yet to be taken.

The board has also initiated a proposal under BOOT mechanism for utilization of its treated water and for the use of recycled water for other purposes. A tertiary water treatment plant of 50 mld capacity is proposed for implementation in Bangalore at the Koramangala and Challabhata valley. The details are indicated in Volume II (Annex B) of the Report.

[7] The duration of the contract can be extended if the guaranteed rate of return is not achieved within the concession period.

The extent of responsibility of the stakeholders in each of the above initiatives is described in Table 3.3.

Table 3.3 Extent of participation in PSP-National experience

Option	State	Operation	Management	Investment	Ownership	Duration
Management contract	Tamil Nadu	Q	Q	P	P	0.5 -3 years
Service contract	Tamil Nadu	Q	P	P	P	1-3 years
BOT	Tamil Nadu	Q	Q	Q	R	30 years

International experience

Private sector participation in areas such as billing and collection, meter installation, etc., as in Mexico City; for contracting out operation of the existing treatment works as in Puerto Rico, and for creating new assets through BOOT options as in Thailand (The World Bank 1998), are some international examples of PSP.

Management contract

The Government of Trinidad and Tobago opted for a management contract (Table 3.4) of 3 to 5 years as a preliminary step for adopting a full fledged concessional agreement in subsequent years in the water sector. First, it found it difficult to amend the existing law in a short time frame, in addition to requiring political commitments for PSP through the latter option. Second, it did not have enough information on the asset infrastructure relating to the water and sanitation sector. Third, it did not have an efficient regulatory capacity to develop an effective tariff setting mechanism as well as monitor and implement the complex concession contract. The government, therefore, adopted, as an interim arrangement, the management services contract for operations and maintenance of the water supply and sewerage system as well as for meeting additional investment targets in the sector. As a part of the long-term plan for introducing concessional contracts, it wanted private operators to collect necessary information for developing a tariff mechanism during the interim period. The other details may be seen in Volume II (Annex I) of the Report.

Concession

In Argentina, prior to introduction of private sector participation in the water and sanitation sector, the government adopted market-oriented reform programmes and privatized the ownership of many government enterprises in

sectors such as electricity, telecommunications and gas. Therefore, the government's efforts in introducing sectoral reforms in water and sanitation sector came as a natural corollary to its commitment to the privatization process in the country. However, performance of this sector managed through public enterprises was not satisfactory. A need for the reduction of the fiscal burden, the improvement of efficiency and quality in the provision of water and sewerage services was recognized, and the government resorted to PSP through the concession option rather than a management contract or lease, as it wanted to attract additional resources in the sector through private operators. It did not opt for the divestiture mode of PSP, as that would have meant a delay in collecting requisite information on valuation of water resources. The other details for private sector participation in Argentina may be seen in Volume II (Annex F) of the Report.

In the case of Bolivia, the government was firm on universalizing the access to water services and sewerage system in the country as a whole and it introduced national regulations from time to time to achieve this goal. Its public utilities in water and sanitation services were not in a position to implement the above regulations, and were unable to expand and ensure water supply and sewerage connections effectively to many parts of the urban areas. As a part of the government's initiatives for PSP, a concession contract (1997) was awarded to Aguas del Illimani under which the latter undertook the responsibility of providing water and sanitation services in the La-Paz-El-Alto metropolitan area. SAMAPA (Servicio Autonomous Municipal de Agua Potable y Alcantarillado), being the erstwhile public service provider in the city, continues to exist as legal entity whose activity is limited to administering the assets leasing contract with the company. The concession contract was subject to strict performance standards such as: a) output standards (i.e., type of service, service quality, source reliability and customer service), b) input standards (e.g., materials and design standards) which are subject to approval by the regulator, and c) expansion mandates. Further, while designing the national regulations for PSP, the government took into account the need for the low-income users group through a well designed subsidy program.

In the case of Chile, the need for additional resources for undertaking expansion and maintenance of various services was felt. In the early 1990s the government set up 13 state owned corporations with responsibility for asset management, operation of water and sanitation services and investment decisions in the water sector. Subsequently, these corporations had to execute concession contracts and were brought under a new regulatory framework. The new regulation reduced information asymmetries, increased managerial incentives, and brought efficiency gains to the public corporations in the water sector. Privatisation through concession ultimately occurred in late 1990s. The other details can be seen in Volume II (Annex H) of the Report.

Divestiture

Prior to 1989, water and sanitation services in England and Wales used to be the responsibility of the Regional Water Authorities. As a public sector activity the government felt the shortage of funds of maintenance for improvement of the infrastructure required for water services. Along with these financial pressures, there was increasing pressure for higher standards for drinking water and waste water treatment. This came from the public and also from European Legislation. About 50 billion pound was estimated to be required between 1989 and 2005 to meet the standards required by the EC (European Commission).

In England and Wales, privatization was seen as the only answer to achieve the government's aims of increased efficiency and access to private funds for investment. So, in 1989, the water industry in England and Wales was privatized. The operational and regulatory functions of the Water Authorities were separated. Companies were created with responsibility for the authorities' operations, and the authorities' assets were transferred to them. These companies were then sold to the public. Initially, the Government kept a golden share in each company, so as to retain some measure of control over their ownership, but these were soon sold, and the Government now owns no part of any of the water companies. The companies operate under licences, granted initially for 25 years. The licences can be terminated after that period, although ten years notice has to be given. If that should happen, the assets would be transferred to another company on appropriate terms. The old private water companies which had continued to exist were brought within the same licensing and regulatory system as the newly privatised companies. Under their licenses the privatized companies are required to provide waste water services for all the customers in their areas, and to provide water for customers who are not served by the old water companies.

The options for PSP and extent of participation in various segments of water services in various countries under study, are summarised in Table 3.4.

Table 3.4 Extent of responsibilities for PSPs - international experience

Option	Country	Operation	Management of system	Maintenance[a] A	B	C	Investment Planning	Financing	Ownership of assets	Duration (years)
BOOT (new assets)	Thailand	R	P	R	R	R	R	R	Company-public sector	10+
Management contract	Trinidad & Tobago	R	R	R	Q	P	P	P	Public sector	3-5
Concession	Buenos Aires, Bolivia, Chile	R	R	R	R	R	R	R	Public sector[b]	20-30
Asset sale	England and Wales	R	R	R	R	R	R	R	Company	Perpetuity

Note.

[a]Under maintenance, three functions (A) planning, (B) carrying out the work, and (C) financing maintenance

[b]assets are transferred to concessionaire for a fixed period of time, but are owned by state

R - Responsibility varies according to contract

P - Responsibility lies with Public Sector

Q - Responsibility lies with private sector

Source World Bank (1998)

4 Scope for private sector participation in Gujarat

The various options and forms of private sector participation (PSP) in water sector have been discussed in detail in the earlier chapter. Also, national and international experiences in PSP have been outlined and lessons for Gujarat have been drawn. This chapter reviews the PSP initiatives in Gujarat in the water sector and recommends a future course of action.

Private sector participation in Gujarat

The major area of concern in urban water supply identified in the Gujarat Infrastructure Agenda–Vision 2010 is the losses in the distribution network. To quote the document, 'the reduction of these losses needs to be the prime agenda in the urban water supply sector, especially because it can be done without major capital expenditure, and would help reduce the need to develop fresh bulk water supply schemes'.

Urban areas

Thus the distribution network in urban areas has been identified as a priority area for initiating private sector participation. However, even though the magnitude of investments required for augmenting and improving the distribution network is relatively less, and benefits are substantial, this segment of the water cycle is politically sensitive due to issues of water subsidy and universal availability.

Bulk water supply is relatively amenable to privatization, since it does not involve substantial social commitments or subsidies, and is therefore a less politically sensitive area. However, only limited benefits would be obtained at the consumer's end if the distribution network were not improved.

The following options are listed in GIDB (1999) for initiating private sector participation in this sector.

- *BOT (Build Operate Transfer – for new assets) / ROT (Rehabilitate Operate Transfer – for existing assets).* This would ensure that the project is of reasonable size and hence attractive to the developer.
- *Management Contract / Service Contract.* Individual treatment plants or pipeline operation could be conducted through a service contract with a private operator.

However, the Gujarat Act No. 11 of 1999 (GID Act) provides for the following options for initiating private sector participation (Table 4.1).

Table 4.1 Options for private sector participation

Build own operate and maintain	Build and transfer
Build lease and transfer	Build operate and transfer
Lease management	Rehabilitate own operate and maintain
Supply operate and transfer	Joint venture

In spite of being identified as priority areas for initiating private sector participation, there does not appear to be any significant privatisation initiative in the water sector in municipal corporations in Gujarat. There has been some degree of private sector involvement in the water sector in some areas. However, this has taken place only in some discrete activities in the water cycle and has been limited to only management and service contracts.

One of the oft-quoted reasons for not initiating private sector involvement is the enormous gap in the demand and supply of water. The argument here is that private operators would not involve themselves in this sector unless they are allowed to operate on commercial principles. Also, since water is such a scare resource in the region, and given the universal service obligation issues in the water sector, it would be difficult to ensure social acceptability and political will for commercialising this sector in the region. Nevertheless, it is important to recognize that given the criticality of the demand-supply gap in the area, and the consequent investment requirements, private sector involvement would result in additional investments in this sector.

Gujarat State Drinking Water Infrastructure Company Ltd

The Gujarat State Drinking Water Infrastructure Company Ltd (GSDWICL) has identified some projects for the purpose of construction of the bulk distribution network for the Sardar Sarovar scheme. These are proposed to be executed with substantial private sector participation. The following three models have been proposed by GSDWICL for these projects.

- GSDWICL becomes the developer of the project and also executes it by sub-contracting the project. The post execution management of the contract is carried out by a private party. The advantage here is that the project execution would be faster

and perhaps cheaper. However, there would have to be a budgetary allocation for the project. Also, the true cost of water supply would not be reflected.

- A joint venture company can be formed by GSDWICL with a private operator, and the project is executed by this joint venture. This has been the model followed for the Tirupur project in Tamil Nadu. However, the following prerequisites have been identified for such an option: establishment of a letter of credit, an escrow mechanism, and government guarantees. Also, as has been the case with the Tirupur project, achieving financial closure for such a project can be difficult.
- A Build, Lease, Manage, Transfer project. Here the project is executed by a private operator, and then leased to GSDWICL by the private operator. The project is managed by a private operator (not necessarily the executing entity). Such a model would not require any contribution from the government.

Scope for private sector participation

The following section outlines the recommended strategy for initiating PSP in all segments of the water sector in Gujarat.

Sourcing of water

Sardar Sarovar Narmada Nigam Ltd

The SSNNL (Sardar Sarovar Narmada Nigam Ltd) was formed as a company to construct and manage the bulk supply of water from the Sardar Sarovar project. The majority of the supply would be for irrigation purposes, which would be supplied by SSNNL itself. The remainder would be for industrial and domestic use. For supply for domestic use, the SSNNL would sell the water to GSDWICL (Gujarat Sate Drinking Water Infrastructure Company Ltd.), which in turn would sell this to local bodies, etc.

The company has raised a large amount of capital on commercial terms for the laying down of the canal network for bulk transmission of water. Thus it is recommended that this company operates on commercial lines charging an economic price for the water supply.

Gujarat Water Resources Development Corporation

The GWRDC (Gujarat Water Resources Development Corporation) is a State Government-owned corporation that supplies water from groundwater resources for irrigation purposes. The number of tubewells owned by GWRDC is less than 3000 forming under 10 percent of the total number of tubewells in the state.

Given the marginal share of GWRDC in the groundwater sector in the state, it is recommended that GWRDC be completely privatized, either by transferring the tubewells to farmers co-operatives, or by divesting it to the private sector.

Department of Narmada, Water Resources and Water Supplies- managed river based projects

Apart from the Sardar Sarovar project, all other river based water projects are owned and operated by the Department of Narmada, Water Resources and Water Supplies. Just as in the case of the Sardar Sarovar project, these projects should also be operated on commercial lines and each project should be made into a profit centre. If the State government feels the need to subsidise any segment, then this subsidy should be explicitly accounted for in the operation of these projects.

Transmission of water

Gujarat State Drinking Water Infrastructure Company Ltd

For the purpose of transmitting drinking water from the Sardar Sarovar based Narmada Main Canal, the GSDWICL was been formed. This company is responsible for laying down the pipeline network for the bulk supply of drinking water, and the subsequent operation of the same. Apart from the SSNNL, the company can purchase drinking water from any other source.

As mentioned earlier, the company is exploring various project execution options including joint ventures and build, lease, manage, transfer formats. Given the size of the project, some governmental support would be necessary. However, it is recommended that GSDWICL should not rely completely on budgetary support for executing the project. The option of identifying a strategic partner and setting up a joint venture for executing the project should be examined for obtaining private sector funds. The continued role of the government in the sector to supplement private investment in the short term, through such joint ventures would ensure that the development of the sector is not impeded by the lack of funds.

Gujarat Water Supply and Sewerage Board

Substantial reorganisation of the operation of the board is recommended. Its regulatory and advisory role should be taken away and it should only remain as an agency for the execution and operation of water sector projects.

Distribution of water

For the distribution segment of the water sector, the following three routes could be explored.

Divestiture

A complete divestiture of the entire distribution network can be explored as an option for those sections of the distribution network that can be isolated from the rest of the network. However, this would require acceptability of the privatisation process and thus little social resistance to liberalisation. Also, as identified in the Karnataka case study, the consumer base would have to be sufficiently large to make commercial operations viable. This would also require a substantial information base on the physical characteristics of the distribution network to exist along with strong regulatory oversight of the sector.

An alternate path to divestiture could be to hive off the water supply activities of the local bodies as separate commercially operated entities, as it was done in Chennai. These water supply companies could then operate with assistance from a strategic partner. Over time, the local body could divest its stake in the company to the strategic partner or through the stock market, thus completely privatizing the sector.

We recommend the latter path for the large municipal corporations in Gujarat, especially Ahmedabad and Surat.

Build-Operate-Transfer/Rehabilitate-Operate-Transfer

For the existing distribution network in large urban local bodies, the ROT mode of privatization could be explored. Here, the existing distribution system would need to repaired and restored to its desired condition by the private operator. This could be considered for some of the smaller municipal corporations and larger municipalities. Wherever the distribution network has not been laid, as in the urban areas adjoining the Ahmedabad Municipal Corporation (Ahmedabad Urban Agglomeration), PSP could take the BOT form, wherein the private operator would also lay down the distribution network.

The informational constraints on PSP would be not strong here, in the sense that complete information on the layout of the network and its present condition could be collected during the process of building or rehabilitating. This kind of a process would also require substantial social acceptance and political commitment, which would need to be developed over a period. Again, as in Karnataka, the consumer base would have to be adequately large. Finally, a commercial rate of return and a stable regulatory framework would have to be ensured to attract private capital.

Management and service contracts

For local bodies that are not very large, sustaining commercial operations throughout the use of private entities can still occur if management and service contracts are given to the private sector in discrete activities like operation of pumping stations and water treatment plants, billing, etc.

This option should be considered by all local bodies wherever it is not possible to introduce private sector participation in any of the other suggested modes. We especially recommend this route for the municipalities and some of the smaller municipal corporations like Rajkot, where the water supply situation is critical and it might be difficult to build support for PSP.

Caveat

Although some options for commercialising operations in the water sector have been suggested, the financial sustainability of each option will have to be assessed with a view to determine the extent of financial support that may continue to be needed from government. It is recommended that an assessment of the financial sustainability may be done before any option is operationalized.

5 Legal impediments to private sector participation

Critics say that it would not be possible to introduce private sector participation in the water sector being managed by local bodies in view of the 74th Constitutional Amendment (CA) (1993). It may be recalled the Ninth Five Year Plan's (1997-2002) strategies for urban drinking water supply envisage PSP (private sector participation) in construction and maintenance of water supply schemes. Even in rural water supply the Plan Document outlines the need for private sector efforts in construction and maintenance of water supply. We now examine these issues in the context of Gujarat State.

The 74th CA, *inter alia*, says that subject to the provisions of the Indian Constitution, the Legislature of a State, may, by law, endow:

a) the municipalities with such powers and authority as may be necessary to enable them to function as institutions of self-government and such law may contain provisions for the devolution of power and responsibilities upon municipalities, subject to such conditions as may be specified therein, with respect to –
   i) the preparation of plans for economic development and social justice
   ii) the performance of functions and the implementation of schemes as may be entrusted to them including those in relation to the matters listed in the Twelfth Schedule;

   b) the Committees[8] with such powers and authority as may be necessary to enable them to carry out the responsibilities conferred upon them including those in relation to the matters listed in the Twelfth[9] Schedule

Following the above Constitutional obligation, Gujarat Act No. 15 and 16, 1993 (in the case of Municipal Corporations), and Gujarat Act No. 17 of 1993 (in the case of municipalities) were enacted by the Government of Gujarat.

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[8] It includes ward committees

[9] This includes water supply for domestic, industrial and commercial purpose (Serial 5)

In Gujarat, the water supply function was vested with the local bodies even before 1993. For instance, in the case of municipalities, the Gujarat Municipalities Act of 1963 says that it shall be the duty of every municipality to make reasonable and adequate provision for the following matters within the limits of the municipal borough, namely obtaining supply or an additional supply of water, proper and sufficient for preventing danger to health of the inhabitants from the insufficiency or unwholesomeness of the existing supply, when such supply or additional supply can be obtained at a reasonable cost. Similar is the case with city corporations which are responsible for ensuring water supply to consumers under the BMPC Act 1949. Thus, no need was recognized to incorporate any changes in this function of the local bodies guaranteed under the existing acts in view of the Constitutional Amendment, 1993.

PSP in the water sector – legal barriers?

We examine the existing acts in order to ascertain the legal barriers, if any, for private sector participation in water sector in Gujarat.

Gujarat Panchayat Act 1993

Schedule I to the above Act outlines the responsibilities of the village panchayat. Under Schedule I at 1(a), it is the obligation of the village panchayat to provide water for meeting household needs. Similar responsibilities have been cast on the taluka panchayat and district panchayat. Thus, there is nothing in the Act which prevents these bodies from arranging water supply in their areas through any persons' including private entrepreneurs.

Gujarat Municipalities Act 1963

Section 65 (1) says, 'A municipality shall be competent to enter into and perform all such contracts as it may consider necessary or expedient in order to carry into effect the said provisions and purposes'. Any such contract is, however, subject to the approval of the municipal authority. Thus, it is possible to provide water supply in municipal areas through any person including private entrepreneurs.

The Bombay Provincial Municipal Corporations Act 1949

Section 189 relating to water supply stipulates that for the purpose of providing the city with a supply of water proper and sufficient for public and private purposes, the commissioner may–with the approval of the corporation–enter into an arrangement with any person for the supply of water. Although the Act does not define a 'person', a

person is a juridical person, and would include 'developer' as defined under the GID Act, 1999 (Section 2[c]). Hence, it is possible to entrust the water supply contract of city corporations to a private sector partner under the overall responsibility of the corporation.

Gujarat Act No.18 of 1979

Section 15 (1) (f) says that the Gujarat Water Supply and Sewerage Board (GWSSB) can enter into contract or agreement with any person or persons as the Board may deem necessary while performing its duties and discharging its functions under the Act. Therefore, it is possible for the Board to perform its functions in water supply related matters through private sector partners.

Gujarat Infrastructure Development (GID) Act of 1999

The GID Act, 1999 provides a framework for participation by persons other than the State government and government agencies in financing, construction, maintenance, and operation of infrastructure projects in Gujarat. Section 4 (1) says that a person may enter into a concession agreement with the State Government, Government agencies, etc., in respect of projects relating to water storage, water supply, and sewerage systems. The nature of concession agreement[10] has been identified in Schedule II under the Act. The Act further lays down the procedure for drawing concession agreement and the selection of a private partner through competitive public bidding or through selection by direct negotiations. It also lays down the procedure to charge for the goods or services provided so long as the project continues to vest in him. Financial security for maintenance of project, transfer of certain rights, termination of concession agreement, etc., have been laid down in the Act itself. Thus, a general framework has been provided for facilitating private participation in water supply in Gujarat.

Gujarat Bill No. 6 of 2000

During the concession operation, a concessionaire often needs to acquire rights of way for laying water pipelines during the project period. The Gujarat Water and Pipelines (acquisition of rights of user in land) Bill 2000 stipulates that government can issue

[10] It includes build own operate and transfer agreement, build own operate and maintain agreement, build and transfer agreement, build lease and transfer agreement, build transfer and operate agreement, lease management agreement, management agreement, rehabilitate operate and transfer agreement, rehabilitate own operate and maintain agreement, service contract agreement, supply operate and transfer agreement, and joint venture agreement.

necessary notification for acquiring the right of users, which may be necessary for transport of water in public interest. Upon such notification, a corporation[11] can take the necessary action for laying pipelines for transportation of water in its areas of operation. Thus, the Bill[12] allows a private developer (who should be qualified under the definition of a corporation as indicated in the Bill) to take necessary action in performing his duties in relation to water supply in the concession areas.

In sum, there is no legal barrier to private sector participation in the water sector in Gujarat. All forms of PSP, as described in Chapter 4, can be adopted in Gujarat, and can be implemented within the existing laws.

[11] 'Corporation' means anybody corporate established under any Gujarat Act and includes: a company formed and registered under the Companies Act, 1956; and a company formed and registered under any law relating to companies formerly in force in any part of India.

[12] The Legislative Assembly of the state of Gujarat passed the Bill on March 8 2000.

6 Regulatory framework to facilitate investment and to promote efficiency and economy

Water resources are scarce in Gujarat, especially in the north, Saurashtra and Kutchh region. Water delivery systems in many local bodies are not sustainable due to externalities, leakage, and pollution. The groundwater extraction rate is very high compared to its recharging the aquifers, considerable leakage exists in the water distribution system and sewerage, and treatment of wastewater is inadequate. The situation is accentuated by the Government's inability to provide adequate funding to meet existing as well as future demand. A need to invite PSP, *inter alia*, in water supply, especially – to begin with – in city corporations, was recognised (GIDB 1999).

The options for such participation have been outlined in the GID Act 1999. They range from short-term service contract to long term concession[13] agreement. Our analysis in Chapter 3 shows that the longer the duration of the contract, the greater the gain from PSP. While a service contract could only ensure technical expertise, the long-term concession contract will also ensure, management expertise, operating efficiency, and additional investment in the sector.

In the water sector, it is difficult to bring in many players which could then result in competition in providing services within a given area, as such service providers would not enjoy economies of scale in providing such services. At the same time, if one were to introduce competition[14], the selection of the right to supply such services has to be determined on a competitive basis, wherein many players can participate in bidding for such services. In fact, this has been recognised by GIDB under Section 9 of the GID Act 1999. The terms and conditions of such services are generally outlined through detailed contracts. If the contract period is short, it is possible to specify every aspect of contractual details. If it spans a long period of time, it is difficult to write 'time-consistent' enforceable contracts for the entire concession period covering all

[13] Section 4 (3) of GID Act 1999 says "no concession agreement shall provide for transfer of a project by a developer to the State Government, Government Agency or a specified Government Agency competition ensures greater than 35 years from the date of agreement"

[14] Generally speaking an efficient outcome

contingencies that may rise. Where tariffs and relevant factors cannot be unambiguously set out, there would be a need for mid-term reviews. This strengthens the case for an independent regulatory framework.

Water consumers constitute a large proportion of voters, and water services are perceived as essential function of the Government or local bodies, and should be given free of cost. These considerations often compel many public authorities to advance short-term political objectives rather than long-term interests of consumers. Investors are also aware of this type of pressure as well as the consequent vulnerability of their long term and immobile investment. If there is weakness in the credibility of the commitment to regulatory contract, the private entrepreneur deflects such risk by increasing the cost of capital. This is then reflected in higher tariffs, which goes against the interests of the consumer. Therefore, the need for credible commitment to the contractual obligations over the entire contract period is paramount while introducing PSP in the water and sanitation sectors. An independent watchdog can provide such commitments to regulatory contract.

As Governments or their instruments or local bodies would continue to be major stakeholders in the water sector, the authority which aims to balance the interests of various stakeholders, including the Government or local bodies, has to be independent of the Government or local bodies. Independence in the context of regulation means that the authority with the 'expertise' should have all the attributes of autonomy so that it can apply its expertise in accordance with the mandate and subject only to its charter as laid out in the instrument through which it was set up and the laws of the land.

Regulatory framework – international experience

Our study of countries such as United Kingdom, Argentina, Chile, Bolivia, and Trinidad and Tobago (For details, see Volume II) showed that these countries have created an enabling framework in the context of private sector participation. The extent of regulatory oversight has been summarised in the Table 6.1. It clearly shows that such oversight has to increase as one adopts a higher degree of PSP. For instance, the regulatory oversight should be greater as in the use of the divestiture option as in UK, where the Water Regulator (called OFWAT) has the authority to modify licenses, regulate water tariff, promote competition, ensure quality of service, review investment plans, etc. On the other hand, in the case of the management contract operational in Trinidad and Tobago, the regulator has only a tariff-setting function. In the use of the concession mode such as in Argentina, the regulator (called ETOSS) determines water tariffs, approves and monitors investment plans and also disposes complaints.

Further, most of these countries have positioned their regulators at an arms length from the Government or local bodies. These bodies in most cases enjoy a certain degree of independence. The details of each of the country are given in Volume II of the report.

Table 6.1 PSP and extent of regulatory oversight - international experiences

PSP option	Country	Regulatory agency	Regulatory functions
Management contract	Trinidad & Tobago	PUC [a] (Govt)	• Tariff setting
Concession	Buenos Aires	ETOSS [b] (Independent)	• Tariff determination • Approval, monitoring of investment plan • Complaint disposal
Concession	Chile	SSS [c] (Independent)	• Tariff setting • Setting and enforcing technical standards • Granting concessions
Concession	Bolivia	SDA [d](Independent)	• Grant concessions and licenses • Monitor terms and conditions for Concessions and their revocation • Approval of investment plans • Set tariffs for water in concession areas • Recommend water rates in areas run by municipality excluding the concession Areas • Revoke concession
Divestiture	England & Wales	OFWAT [e](Independent)	• Modification of license • Tariff regulation • Quality of service • Consumer complaints • Monitoring and enforcing terms and Conditions of license • Review investment plans

	• Promote competition and efficiency

[a] - Public Utilities Commission; [b] - Ente Tripartite de Obras de Servicios de Saneamiento;
[c] - Superintendent of Water and Sewerage Services; [d] - Superintendencia de Aguas; [e] - Office of Water Services

Regulatory framework - national experience

Unlike in the countries above, India has little experience in independent regulation in the water and sanitation sector. We discuss some of these issues below.

Metro Water

With respect to management contracts and service contracts in Chennai, Metro Water, as a regulator and operator, performs certain functions. These are indicated in Table 6.2. It is chaired by a political person. Its regulatory oversight extends over the contracts it awards.

Table 6.2 PSP and the extent of regulatory oversight- Metro Water

Regulatory agency	Regulatory functions
Metro Water[15]	▪ Tariff determination ▪ Licensing / awarding contracts to private operators ▪ Monitoring compliance with the terms and conditions

Tirupur

As stated in Chapter 3, under the BOOT form of PSP, a regulatory framework for certain functions exists in the form of an Independent Auditor, an Independent Engineer, and a Charges Review Committee. Their functions are detailed in Table 6.3. A detailed case study of the project is presented in Volume II (Annex E) of the report.

Table 6.3 PSP and the extent of regulatory oversight - Tirupur

Entity	Function
Independent Auditor	Carry out periodic review of the financial terms of the concession agreement and certify the same. Furnish data to the Charges Review Committee
Independent Engineer	Carry out periodic review of the compliance with technical requirements, performance standards, and costs of construction, operation and maintenance of

[15]Metro Water is a regulator as well as operator in its areas

	the facilities, establish the methodology of estimation of transmission losses, monitor the transfer of facilities, and review the overall progress of the project
Charges Review Committee	Regulate changes in tariff required besides those provided for in the concession agreement

Regulation of tariff – Charges Review Committee

The Concession Agreement (CA) in Tirupur provides an option to the concessionaire to charge for water supply and sewage disposal facilities. The formula for tariff determination is spelled out in detail in the CA. Additionally, a Charges Review Committee has been constituted to regulate changes in the tariff structure and revisions that may be required due to events beyond the control of the concessionaire. The committee has representatives from the concessionaire and the State Government, and is presided over by an independent judge. The concessionaire initially proposes to levy a combined charge based on volume of water off-take.

Regulation of service standards

In order to ensure satisfactory compliance and performance, the CA requires the concessionaire, the State Government and the local municipality to appoint reputed agencies with relevant track record as IA (Independent Auditors) and IE (Independent Engineers) to undertake a process of periodic technical and financial reviews and certification. The IE and IA would act as independent authorities and regulate the terms of the CA.

In sum, a project specific regulatory framework has been conceptualised in the form of the Tirupur concession agreement. The contractual regulators such as IE and IA are responsible to the authorities who are the executors of the project. This arrangement is in sharp contrast to the international experiences discussed above.

Only in respect of tariff matters under the Tirupur Concession Agreement, is there an independent Charges Review Committee.

Need for independent regulation

In Chapter 4, we have outlined the scope of private sector participation in Gujarat's water sector. The corporations or the developer would be the service providers, and are expected to run on commercial principles. A fall out of the privatisation process is the likely increase in transaction costs, which have to be mitigated. The activities of the above monopoly service providers would have to be regulated for protecting the interests of consumers. A strong regulatory framework, which would not only protect the interests of the investors, but also balance them with the public interest in general

would be called for. Such a regulatory framework has to be outside the existing Governmental set up, and should have an arms-length relationship with the Government as well as local bodies. Else, the requisite enabling environment which could ensure protection of consumer interests, generate consumer trust, ensure fair returns to utility, attract private investment in the water sector, better delivery of services, and transparency in governance, would not be created.

Recommendation 1

There should be a Water Regulatory Authority which should maintain an arms-length relationship with stakeholders, including Government as well as local bodies, to regulate segments of water supply as discussed below.

Instituting a regulatory authority

In India, with the reforms and liberalisation of the economy starting around 1991/92, the power and telecom sectors were thrown open gradually to private investment and competition. In 1991, the telecom sector was opened up with private investment being permitted in the manufacture of telephone equipment. Value-added services were thrown open for private investment in 1992. Private sector participation by way of leasing port facilities, in the ports sector, was permitted in 1994 and investment in the creation of new facilities in the existing ports or establishment of new ports in 1996. However, the need to regulate the entry objectively, and to establish a regulatory framework based on which private investment could be forthcoming, was not fully understood. Therefore, regulatory reforms were not contemplated as part of the initial reform process in these sectors. Instead, regulatory reforms were brought in much later. In the port sector, a decision to set up a tariff regulatory authority was, however, announced as a part of the policy statement in 1996, although it was implemented only in 1997. Only in the case of insurance sector, did the positioning of an autonomous regulator precede the introduction of the sector restructuring process.

In the water sector in Gujarat, there are at least two reasons why the regulator should be in place even before private sector participation is initiated in the sector in a substantial way. First, there is a need to improve the operational efficiency of the water supply service providers by aligning the cost of supply with the tariff. This would make the operation of these services more sustainable and eventually more attractive to the private sector. Secondly, there is need to set standards of service, and enforce the same. The regulator should be able to take an independent view of this. Given the above experiences, it is desirable to position the WRA in Gujarat, before the water sector is opened to PSP.

Recommendation 2

Before the water sector in Gujarat is opened to PSP, the Water Regulatory Authority should be constituted.

Regulatory functions

Activities of the water cycle to be regulated

There are four components in the water delivery system: a) capturing the sources, b) transmission (or conveyance) of water to a place, c) treating water, and, d) delivery of water to users. Unlike other sectors, fixed costs in all these segments are very high compared to variable costs. Some components in water system show economies of scale, and tend to promote / create a natural monopoly. For instance, water capture from a particular source is likely to have natural monopoly characteristics. So is the water transport and distribution system which exhibits engineering scale of economies. Pumping from underground acquifers may not have natural monopoly properties: pumping from many wells can be organised into multiple and independent sources. However, pumping from one well can cause a drop of water level so that pumping at the other wells is expensive. Thus, efficient exploitation of a single aquifer from many wells may require some form of centralised regulation of pumping. Water treatment is to some extent, a natural monopoly. While water treatment plant in themselves may not have scale economies, treating water that is delivered from a single transportation system is likely to be most efficiently undertaken at a single site or near the end of transportation pipe. Thus, it is evident that capture, transmission, and treatment from each water source all monopoly characteristics. Further, distribution is also a monopoly.

As stated in Chapter 2, surface water and ground water constitute different sources of water supply in Gujarat. Surface water in dams, reservoirs, and rivers are brought to the consumer through pipes or canals. Surface water is used for irrigation and non-irrigation purposes (for example, drinking water, industrial use etc). Similarly, the ground water is also used for irrigation and non-irrigation purposes.

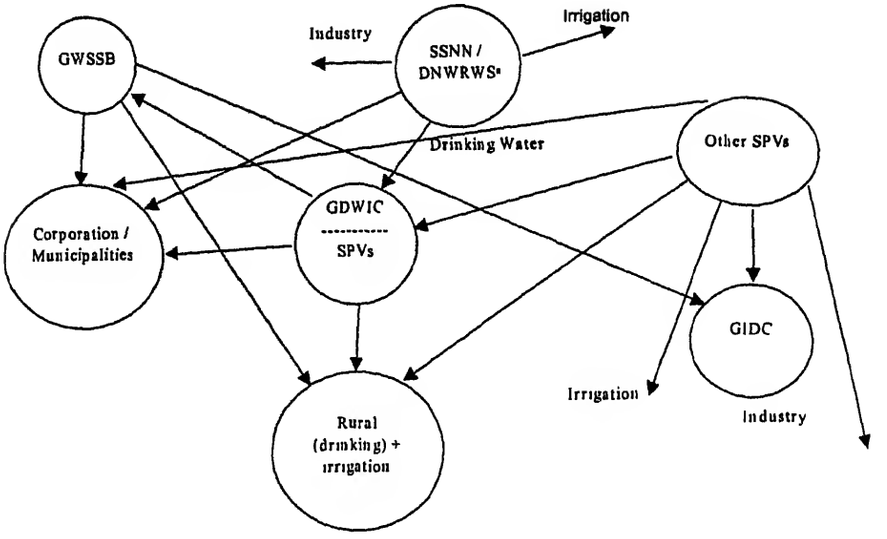

Figure 6.1 Structure of water services in Gujarat

*Department of Narmada, Water Resources and Water Supply

The owners and suppliers of surface water are a) SSNN (Sardar Sarovar Narmada Nigam) and b) DWR (Department of Water Resources) whose area of operation extends over the entire state of Gujarat. Ground water is extracted by many local bodies[16], private individuals, and the Department of Water Resources (through Gujarat Water Resources Development Corporation Ltd.). There are SPVs or other agencies who own transmission (or conveyance) networks for the bulk supply of water in Gujarat (Figure 6.1). For instance, GSDWICL (Gujarat State Drinking Water Infrastructure Company) will be sourcing water from sources such as SSP (Sardar Sarovar Project) or Mahi river, and conveying the same through its network to bulk consumers over the entire state. These companies have monopoly characteristics in the water market. Further, the distribution segments of the water delivery system in the local bodies are monopolies. Similar is the case with SSNNL (Sardar Sarovar Narmada Nigam Ltd.), which is capturing the water, conveying the same and selling water in bulk for irrigation as well as non-irrigation purposes. The Department of Water Resources also is a service provider with monopoly characteristics in the water market in the state of Gujarat. The above monopoly service providers are spread over the entire state. It is thus logical that the jurisdiction of the Water Regulatory Authority should extend over the entire state too. And the segments of the water supply system such as capturing services,

[16] Local bodies include city corporations, municipalities, village panchayats

conveyance of water and distribution of water, which have monopoly characteristics, should be subject to regulatory jurisdiction.

However, it must be noted that with the 73rd and the 74th Constitutional Amendments, the water supply function vests with the local bodies. Thus any changes that are proposed should not violate the spirit of the 73rd and the 74th Constitutional Amendments. To ensure this, it is recommended that the regulatory reform process should be consultative and the State Government should establish a consensus with the local bodies which would fall under the purview of the independent regulator. This would be imperative given that the sector is socially and politically sensitive.

Recommendation 3

The Water Regulatory Authority (WRA) should have jurisdiction over the state of Gujarat and should regulate the following segments of water supply system:

- Capturing the sources
- Transmission (also called 'conveyance') of water
- Treatment of water
- Distribution of water

Tariff regulation

As stated earlier, monopoly service providers in Gujarat include the following.

1) Agencies for capturing sources
2) Agencies for transmission or convergence of water
3) Agencies for treatment of water
4) distribution (or retail supply) of water to end consumers

In Gujarat, agencies that capture water also convey the same. For instance, SSNNL captures water in the Sardar Sarovar dam, and sells it in bulk to intermediaries such as GSDWICL or directly to other bulk consumers. Similar is the case with the Department of Water Resources. Other bulk suppliers would include GSDWICL, GWSSB, etc. (Figure 6.1). Distribution or retailing on the other hand, would be performed by local bodies, or private 'developers', GIDC, etc.

Regulation of water tariff (or charges) as applicable to these monopoly service providers should be one of the primary functions of the WRA. In effect, the WRA would need to regulate the

1) Tariff for bulk water
2) Tariff for retail water

However, it has been suggested by the Government of Gujarat officials that tariff regulation by an independent authority at the initial stages may not find favour with most stakeholders. There is concern that tariff regulation, based on the principle of full cost recovery would meet with stiff opposition from the public and thus might be politically unviable. Thus, a more gradual approach in introducing tariff regulation is suggested. Therefore, in **Phase I** of the regulatory process, the regulator should concentrate upon laying down the tariff principles, and their enforcement should be the prerogative of the State Government. The duration of Phase I should be decided by the Government, but should not ideally exceed three years.

In the **Phase II** of the regulatory process, the regulator should regulate the tariff; bulk as well as retail. However, while it would be desirable for the WRA to regulate the charges for retail water, it may not be feasible, or practicable, even during Phase II of the regulatory process, upon considering that the numbers of local bodies responsible for water supply are too many[17]. In these cases, it is, however, possible for the WRA to suggest principles for determination of water tariff. Such principles should be taken into consideration by these local bodies at the time of fixation of water charges in their areas.

Recommendation 4

The WRA should frame principles for determination of tariff for water services in Phase I. In Phase II, the WRA should regulate bulk and retail tariff.

Private sector participation

Under the existing acts[18], the various bodies such as corporations, municipalities, GWSSB, or Panchayats are authorised to contract, if required, water supply functions to any person including private operators (Chapter 5). The GID Act also authorises the GIDB to recommend the terms and conditions of the concession[19] proposal and agreement beyond Rs 500 million of various agencies including these bodies.

The WRA, being a expert body, should be in a position to develop generic terms and conditions of various concession agreements keeping in mind the interests of the consumers as well as those of PSPs. Although GIDB would be the recommending body for such concession proposals, it is desirable that it should also take into consideration such recommendations of the WRA. Further, local bodies in charge of issuance of the

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[17] There are more than 220 urban centres including 6 city corporations

[18] Such as GID Act, 1999; BPMC Act, 1949; Gujarat Municipalities Act (GMA) Act, 1963; Gujarat Act (GA) No. 18 1979, Gujarat Panchayat Act (GPA), 1993

[19] Concession agreement is defined in GID Act 1999

concession agreement should take into consideration GIDB recommendations , while finalising the concession agreement. Further, if the Government directs the WRA to recommend the terms and conditions of a specific concession agreement, the WRA, being an expert body, should recommend the same.

Recommendation 5

The WRA should recommend generic terms and conditions for all new concession agreements in the water sector.

Recommendation 6

The WRA should recommend terms and conditions of a specific concession agreement if required by the Government.

Since the WRA would be recommending the terms and conditions of the concession agreement, it is desirable that the regulatory authority also monitor such terms and conditions over the duration of the agreement. This monitoring could be over and above the monitoring being envisaged by the GIDB and other local bodies. The WRA would act as an independent watchdog over the performance of the private concessionaire over the contract period.

Recommendation 7

The WRA should monitor terms and conditions of the new concession agreement between developer[20] and local bodies in water sector.

lity of service

Water services in urban areas of Gujarat are far from satisfactory. A study by, the, Public Affairs Centre, Bangalore on the AMC (Ahmedabad Municipal Corporation) in respect of 'poor self-employed women' (Box 6.1) suggests that there is a need to improve quality of services in such areas.

Box 6.1. Reports Cards

A number of efforts using "report cards" have been undertaken in India to establish and monitor public opinion with respect to the delivery of public services. Report cards are a method of measuring public opinion in a structured way using household sample surveys, focus group discussions, case studies, and documentation of information from service providers and interviews with a sample of the lower-level staff of the agencies. The cards attempt to assess, rank and benchmark the following parameters: overall satisfaction with service delivery; the extent and coverage of services; patterns of emerging problems; the response of agencies to reported problems and grievances; and the effectiveness of bribes ('speed money') in rectifying reported problems.

These studies have generally found that

- Administration of public services is uniformly low across most cities
- Supply shortages are often man-made and information is manipulated for personal gain
- The popular belief that public services are cheap is a myth, when full account is taken of the real financial and economic cost of service provision.

The findings also suggest that

Quality of service comprises of water quality as well as standards of service to customers. With respect to quality, GWSSB and urban local bodies in Gujarat follow water quality standards as laid down by WHO and BIS. There is no specific provision in the existing legislation which mandates the service providers to lay down and enforce water quality standards. There is, thus, a need to ensure that minimum standards of water quality are statutorily laid down and adhered to by different service providers.

Water quality has health and environmental implications and therefore, regulatory interventions would remain with the Government or its agencies even after private sector participation in the water sector. Since water is essential to life, and has to be provided to consumers with adequate quality, many countries such as UK have kept water quality control under the Government, so as to set and ensure proper water quality standards. In UK, because of pressure from the public as well as the Green lobby, by keeping this regulatory function under its ambit, the Government is regulating water quality standards through its Drinking Water Inspectorate under the Department of Environment, Transport, and Regions (DETR). It has two roles: through its audit role, it carries out annual inspections of companies, and checks the results of monitoring and the reliability of data on tests carried out by companies. It also investigates incidents where standards are breached. If monitoring shows that water companies are failing to meet required standards, the Inspectorate takes enforcement action. Under the current regulation, companies are required to say what they propose to do to secure compliance with the standards, and then, to give legally binding undertakings in relation to that action. The investigation of incidents can similarly lead to enforcement action, and can

also lead to prosecutions of water companies if they have not exercised due diligence in carrying out their work. Drinking water standards in the UK derive mainly from the EC Drinking Water Directive. Companies are required to carry out nearly three million tests on their drinking water supplies each year, and to report the results to the Inspectorate.

In Gujarat, the Government may continue to regulate water quality standards through the existing Health Department. For this, the Health Department needs to be strengthened so as to be able to lay down and enforce the minimum standards of water quality in the State. Else, the Government may assign this function to the WRA, which can develop and lay down the water quality standards through the transparent regulatory process. Water quality issue is further discussed in the report under Chapter 8.

Recommendation 8

There should be a minimum standard for water quality to be provided by various service providers to their consumers. Either the WRA or Government of Gujarat should lay down and enforce these minimum standards. They should also monitor and enforce the above standards through surveys. Standards of services to customers have been set by some corporations such as AMC through their Citizens Charters. These relate to setting a time-frame for repair leakage, remedy of contaminated water, repair for water stoppage, water connection, etc. The QOS (quality of service) parameters, as set by AMC, are a good step in its attempt to provide improved services to water customers. There are other parameters such as inadequate water pressure, supply interruption (Box 6.2), on billing contacts, etc., which could also form an expanded list of such QOS parameters. The QOS parameters would have to be determined and updated on a continuous basis, and should be enforced. The role of the WRA in facilitating a framework for improving QOS to consumers has been recognised in many countries in the water sector. It is possible that WRA may take the existing QOS parameters as the base QOS to begin with, and then gradually revise the same for better services to consumers. Since the conditions in local bodies vary widely, the QOS parameters need not be uniform: the WRA may frame the minimum standards of services for all water utilities. Over time, these QOS parameters could be revised, if required.

Box 6.2. Private participation and the poor: International experience on service quality

Poor water quality leads to sickness. Unreliable supply increases the coping costs experienced by disadvantaged groups. Private management and finance can reduce these problems. In Puerto Rico, the private operator is required to comply with tough US environmental and drinking water quality standards, and is liable for large fines in case of default. In Trinidad and Tobago, the operator is paid a bonus for increasing the number of households with at least a 12-hour daily supply. Since private participation, Buenos Aires no longer suffers from water shortages in the summer months. In Manila, the concessionaires are required to comply with drinking water standards from the Corporation/Municipalities (and provide) uninterrupted 24-hour service throughout the city.

Source The World Bank (1998)

Recommendation 9

The WRA should lay down and enforce minimum standards of service to consumers. It should also monitor such standards through surveys.

Promoting economy and efficiency

Public service providers in Gujarat's water and sanitation services are not operating efficiently (Chapter 2). They suffer from many weaknesses: inadequate planning, inability to become financially solvent through proper user charges, lack of management autonomy and accountability, lack of consumer orientation, lack of better accounting and financial management, etc. In Chile, National Water Regulator takes steps for making the public service providers efficient and viable through better accounting and management practices and other measures. In UK, the regulator promotes economy and efficiency of the water companies. If the water sector runs inefficiently it would go against the consumer's interest. It is, therefore, necessary that measures are taken to improve the sector by improving its efficiency and economy of operation.

Recommendation 10

The WRA should promote economy and efficiency in the water supply services in Gujarat.

Promoting competition

In Gujarat, as in many other countries, it may take time to introduce competition in the water sector in the real sense. It is, however, possible to provide a framework for introducing 'comparative competition'[21] among the various service providers in local bodies. It could start initially with six corporations in Gujarat, and gradually expand to other local bodies. The WRA can collect information on certain parameters, compare the same among various service providers, and set standards at a higher level, which could

[21] It includes a) a pure version where the price a firm charges is set by costs of other firms in the industry, b) 'regulatory benchmarking of service providers' against each other to estimate efficiency, and setting price caps accordingly, c) publication of comparisons of companies 'or service providers' performance in the media. (The World Bank 1998c)

be comparable with the best performed utility at the national level or at the international level at a later date. This type of 'comparative competition' is being used in UK by OFWAT in bringing higher efficiency in the working of water companies, as well as to bring in economy of operation. At the State level in Gujarat, a framework is required to introduce such competition, and the WRA could be the appropriate authority for this purpose.

Recommendation 11

The WRA should facilitate competition in the water sector in Gujarat.

Adjudication of disputes

As stated earlier, with the introduction of new service providers including 'developers', there will be many players in Gujarat's water sector. While individual concession contracts would invariably incorporate a provision for dispute settlement between a 'developer' and an agency[22], a framework for adjudicating disputes amongst different service providers such as wholesale suppliers of water, bulk suppliers of water etc., is essential. Further, such fora must also address consumer issues, especially quality of services.

Recommendation 12

The WRA should adjudicate upon disputes and differences amongst various service provides or / and between a service provider and a group of consumers.

Advisory role

The requirements of water in Gujarat are met from ground water as well as surface water. Substantial quantity of ground water is extracted to support irrigation, industry, and drinking water requirements. This study noted the over-exploitation of ground water: ground water exploitation is more than recharge. There is a reduction in yields from tubewells, and general deterioration of the quality of ground water.

Schedule VII, List II (Entry 17) of the Indian Constitution says 'Water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storages, and water power subject to provision of Entry 56 of List I'[23]. Unlike surface water, which is a public property, ownership of groundwater goes to the owner of the land above, and its use and disposition are governed by tenancy laws. Thus, the legal and absolute right of

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[22] Agency has been defined in GID Act 1999

[23] List I (Union List), Entry 56 says "regulation and development of inter-state rivers and river valleys to the extent to which such regulation and development under the control of the Union is declared by the Parliament by Law to be expedient in the Public Interest".

the ground water rests with the owner of the overlying land. This kind of right has implications for accessing water as well as distribution of benefits from the use of such water. By virtue of this right, many farmers lay a disproportionate claim over the resources, than others, with the use of higher pumping capacity and deeper tubewells in the field. With regulatory restrictions practically non-existent in Gujarat, excessive withdrawals of water from many areas has reduced the sustainability of ground water stocks and supplies. The existing rules (for example, rules used by the State Electricity Boards for electric connections for pumpsets for farmers) are unable to control resource depletion and ecological degradation in the State. We understand that the Government is yet to consider and adopt the 'model groundwater Bill' in this regard.

Comprehensive management on a river-basin basis, conjunctively for both groundwater and surface water and incorporating both quality and quantity aspects of water, are often ignored. There is no single authority in Gujarat which looks into the use of surface water and ground water as a whole. There is no water use policy in Gujarat[24]. The Government of Gujarat should call for a report of annual water use from the WRA. Further, the WRA should also monitor such use by local bodies.

Sustainable development[25] through integrated management of water services available in various forms have to be recognised. The role of the WRA has to be defined in a broader context as well. Conservation of natural resources, improvements in the quality of water in conjunction with quality of air or land, improvement of standards of waste management and disposals, managing water resources to achieve the proper balance between societies' needs and the environment, etc., are some issues required to be addressed in the water sector. And, the advice of the WRA should be sought by the Government, and the WRA, being an expert body, should advise it accordingly.

Recommendation 13

The WRA should aid and advise the Government for developing a Water Use Policy for Gujarat. The Government should call for an annual report on water use in the state from the WRA. The WRA should monitor such annual water use.

Relationship with other regulators

[24] Which should include the use of surface water as well groundwater

[25] Sustainable development is such development that meets the needs of the present without compromising the ability of future generations to meet their needs

[26] Sustainable development is such development that meets the needs of the present without compromising the ability of future generations to meet their needs

The WRA in Gujarat would be required to interact with other regulators such as Gujarat Pollution Control Board. The Board is authorised to prevent and control water pollution. It has the power to take samples for analysing water quality from any stream, well or sewage or effluent passing from any plant, or vessel etc. into any such stream or well. As stated earlier, there is no law for efficient management of ground water in Gujarat. There is a need to formulate guidelines for sustainable water use in the State.

Recommendation 14

The WRA should co-ordinate with other regulators such as Gujarat State Pollution Control Board for framing and evolving guidelines for sustainable water use in the state.

Other functions

The WRA in Gujarat may be required to perform functions, which are supplemental, incidental or consequential to any of the functions stated above. In particular, it is felt that the limiting the jurisdiction of the regulator to the water sector may not be feasible as the water sectors has strong linkages with the sewerage sector. Currently, both the sectors are being regulated by the same agencies. For instance, the GWSSB undertakes construction activity in both the sectors. Similarly, the Municipal Corporations in Gujarat are responsible for the provision of both these services. Thus, if the regulatory functions in both the sectors were to be separated, there would be considerable overlap of the regulatory activities between the regulatory agencies in the two sectors. Hence, it is recommended that the scope of the WRA should be expanded to include the sewerage sector also. The timing of assigning such functions may be determined by the Government.

Recommendation 15

The WRA should perform such functions as are assigned to it by the Government of Gujarat at a later date.

Summary of functions to be performed by the Water Regulatory Authority

In sum, the Water Regulatory Authority (WRA) should have the following functions:

a) The regulator should frame principles for determination of tariff for water services[27].

b) There should be a minimum standard for water quality and service to be provided by various service providers to their consumers. The WRA[28] should lay down and

[27] In Phase II of the regulatory process, the WRA should also regulate water tariff as discussed in the earlier sections

enforce minimum standards. It should also monitor the above standards through surveys.

c) Promote economy and efficiency in the water supply services in Gujarat.
d) Facilitate competition in water sector in Gujarat.
e) Adjudicate disputes and differences amongst various service provides or / and between a service provider and a group of consumers.
f) Recommend generic terms and conditions of the new concession agreements in water sector.
g) Recommend terms and conditions of a specific concession agreement if required by the Government.
h) Should monitor terms and conditions of all new concession agreements between developers[29] and local bodies in water sector.
i) Aid and advise the Government for developing a Water Use Policy for Gujarat, and monitor such annual water use.
j) Co-ordinate with other regulators such as Gujarat State Pollution Control Board for framing and evolving guidelines for sustainable water use in the state.
k) Perform such functions as are assigned to it by the Government of Gujarat at a later date.

So far, all the functions as indicated above used/are required to be exercised by the Government or local bodies in Gujarat. This arrangement did not yield a satisfactory outcome, as we have seen in chapter 2. No substantial private investments took place in water sector in Gujarat. Earlier in the chapter, we have argued the case for independent regulation. This can be accomplished through enactment of independent legislation. This is called for due to the following reasons.

a) A new legislation will demonstrate the Government's commitments to the reforms and would thereby reduce the risk perceived by potential investors
b) Introduction of a new legislation would eliminate the possibility of conflicting provisions and interpretations under different Acts

Further, the independent regulation through separate enactment will send a signal not only to potential investors but also to the public in general that the Government is committed to protect public interest even in the event of private sector participation. Therefore, regulatory functions as stated above should be given to WRA through

[28] If the Government intends to assigns this function to the WRA. For details see recommendation 10
[29] Developer is defined under GID Act 1999

independent legislation. Other aspects of the regulatory framework constitute of the WRA, are discussed below.

Regulatory framework: design issues

Regulatory independence

The WRA is required to effectively discharge its duties under the statute and for the purpose, it should enjoy some degree of freedom for its functioning. This independence, however, cannot be absolute. This means that it will be subject to the laws of the land, and the policy of the Government. Its autonomy has to be guaranteed by law.

Some parameters, considered essential to ensure the autonomy of a regulator, are as follows: transparent selection process, well laid-out qualifying and disqualifying criteria, a prescribed tenure, capability of the regulator to access expertise without seeking the Government's approval, authority to incur expenditure without the Government's prior approvals and, finally, criteria for removal.

There are different approaches being adopted across the world on the issue of an effective selection process. The executive and the legislature jointly decide the appointment of regulators in countries like USA. In Argentina, ETOSS members are nominated (Table 6.4). In the UK, the executive selects the water regulator. In India, in the power sector like in Gujarat, a committee[30] prepares a panel of names of regulators at the first instance for consideration by the executive. In the India's telecom sector, it is left to the executive to appoint the regulator. Ideally speaking, a regulator should be chosen through a transparent process for attracting the best available expertise in the field. A committee may prepare a panel of names and, the appointment of members of the regulatory authority is made by the Government.

On the question of constitution of a regulatory authority, many countries entrust the decision-making authority to a commission of three to five members while others prefer a single individual. Each system has its own advantages and disadvantages. In India, there is a general consensus for a multi member regulatory authority. For example, in the power sector in Gujarat, the GERC (Gujarat Electricity Regulatory Commission) has three members, while the CERC (Central Electricity Regulatory Commission) at the national level has five members.

Common qualifications for selecting members of a regulatory authority include sufficient experience in economics, finance, law, administration, or industry. In a multi-member authority, not more than one member should be drawn from any one category. Similarly, criteria for disqualification should include an interest in the regulated firms,

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[30] Under the Electricity Regulatory Commissions Act 1998 (Section 18 [1]) enacted by the Government of India

as this could lead to a conflict of interests between the regulator and the stakeholders. Further, commercial employment in the relevant industry should be prohibited once a regulator completes his or her tenure in the regulatory authority. In Chile (Table 6.4), there are no restrictions on regulators being employed in the regulated utility. But, the regulated entities in Chile are mostly State-owned companies with low salary structure that can offer low incentives. However, with more private operators in the water sector, the regulatory 'capture' in Chile cannot be ruled out.

In most countries, members of a regulatory authority enjoy fixed but staggered tenures. However, the issue whether the regulator should be eligible for re-appointment has been dealt with differently in different countries. For instance, in USA and Argentina the regulators are eligible for re- appointment. In India, many statutes are silent on the issue. Considering that the expertise gained over a period of the tenure in the authority could be effectively utilised further, then is a case for the members being made eligible for re-appointment through the prescribed selection process along with the other candidates.

Tenure of members of all the regulatory authorities in the electricity sector in India is five years, while it is three years in telecom sector. In Orissa, tenure of initial three members of the OERC (Orissa Electricity Regulatory Commission) had been staggered for a varying period of three, four, and five years respectively, so as to avoid the, retirement of all members of the commission, and at the same time to ensure continuity in the functioning of the commission. However, the upper age limits between members and the chairperson should be made uniform.

Whenever a regulator is required to be removed from the office, it should be on stated grounds, and the process of such removal should be transparent. While the Government should be the authority for removing a regulator, it should do so on the advice of an independent authority such as the High Court, State PSC (Public Service Commission), etc.

The degree of financial and organisational autonomy of various regulatory authorities vary in India. For instance, the TRAI (Telecom Regulatory Authority of India) has been allowed to levy fees and charges and to set up its own fund whereas the CERC (Central Electricity Regulatory Commission) is wholly dependent upon the Government for funding, although CERC funds are charged to the Consolidated Fund of India, but not voted. The CERC also requires the Government's approval for the creation of posts. Further, in Orissa, (in the case of OERC [Orissa Electricity Regulatory Commission]) the Government's approval is required for the creation of posts, although the expenses can be charged to the consolidated fund of the State.

The regulatory authority should be able to hire expertise independent of the Government's approval. The salary structure of such staff should be determined by the

regulator in order to attract the best expertise and it should not be subject to Government control.

There are two distinct methods available for dealing with the funding mechanism of a regulator, namely earmarked funding from the Government budget and levy from the consumers indirectly through the regulated utilities. For instance, in Argentina, the cap on the levy of fees is 2.67 percent of the consumer bill in the case of a water regulator. In India, since the concept of funding a regulator through a 'charged' budget has not eliminated the interference of the executive, a case lies in setting up a 'Regulatory Fund' for the regulatory authority. The fund can source grants from the Government in the initial stage and fees thereafter. There should be a cap on the levy fees, which may be fixed by the Government.

Table 6.4 Regulatory autonomy - international experiences

PSP option	Country	Regulatory agency	Features for regulatory independence
Management contract	Trinidad & Tobago	PUC [a] (Govt.)	• Regulator placed within the Government
Concession	Buenos Aires	ETOSS [b] (Independent)	• Members nominated from Presidency, Provinces and Municipalities of Buenos Aires • Funding depends on the revenue of the regulated entity
Concession	Chile	SSS [c] (Independent)	• Law does not place any restriction on who could hold top executive position • Law does not place any restriction on re-employment, even to regulated entities • Professional staff enjoy salaries more than civil service staff salaries
Concession	Bolivia	SDA [d] (Independent)	• NA
Divestiture	England & Wales	OFWAT [e] (Independen	• Appointed by the Government for a fixed

	t)	term. Eligible for reappointment. An independent single-member body

[a] - Public Utilities Commission; [b] - Ente Tripartite de Obras de Servicios de Saneamiento;
[c] - Superintendent of Water and Sewerage Services; [d] - superintendencia de Aguas; [e] - Office of Water Services

Recommendation 16

1. The WRA should consist of three members. The Chairman and Members of WRA should be selected through a Search Committee. The Search Committee should be chaired by the following members.

- Chairman of the Gujarat Public Service Commission, who should be the Chairman of the Selection Committee
- Secretary in-charge of Urban Development
- Senior most Secretary in the Department of Narmada, Water Supply, and Water Resources, as the Convenor of the Committee

The qualifications of the Chairman and Members should include:

- The Chairman should have special knowledge and professional experience in the field of administration, economics, commerce, law or management, consumer affairs, and should be a person who is or has been an Additional Chief Secretary to the Government of Gujarat or has held an equivalent post in the Government.
- One member should have qualification and experience in the field of engineering with specialisation in water supply, water resource management and planning, and should be a person who is or has been a Chief Engineer to the Government of Gujarat or has held an equivalent post in the Government.
- One member should have qualification and experience of not less than 15 years in the field of finance with a special reference to investment and cost analysis in the Government or in any financial institution or industrial or services sector.

2. The tenure of the members of the WRA should be five years. The Chairman and the members should be appointed on a staggered basis with maximum age limit of 65. The reappointment of members should be allowed. Disqualification criteria should include interests in regulated entities, in addition to the following.

- Member of Parliament of any State Legislature or of any local authority, or political parties
- Insolvency, unsound mind, conviction of any offence etc.

3. The members of the authority should not be removed without a cause. Any member of the WRA shall only be removed from his office by order of the Governor on the ground of proved misbehaviour after an enquiry by the High Court on a reference by the Government. The Governor may suspend any Member of the Authority, in respect of whom a reference has been made to the High Court, until the Governor has passed orders on the receipt of the report of the High Court on such reference.

4. The members of the authority should not appear before the authority as a representative of any person for a period of three years of his completion of his tenure, and should not acquire any interests in the regulated entities.

5. The authority shall have its own fund and all receipts of the authority, including grants from the State Government, should be credited thereto and all payments by the authority shall be made therefrom. The Authority should prepare its own budget.

6. The authority should be able to hire expertise independent of Government control.

7. The WRA should be advised by an Advisory Committee. The composition of the Advisory Committee should be determined by the WRA in consultation with the Government of Gujarat, and it should include interests of local bodies in addition to representing interests of industry, agriculture, labour, consumers, non-Governmental organisations, academic, research bodies in the water sector. The functions of the Advisory Committee shall be to advise the WRA on major questions on policy, on matters relating to tariff and quality of service, matters relating to protection of consumer interests and overall standards of performance of service providers.

Regulatory accountability

If a regulator is made autonomous, it must be accountable for its actions. It should not be seen to protect the interests of only certain groups. It should balance the interests of stakeholders in a fair manner. Clear rules, an open regulatory process, and decisions with reasons can alone ensure this. The stakeholders must be given the opportunity to present their views; the regulatory decisions must be published, and the reasons for such decisions clearly stated; and it should be possible to appeal against the regulator's decisions.

This would imply that the regulatory process should be such that all potential stakeholders are aware of the regulatory process and have an opportunity to present their views freely and frankly. Regulatory legislations in India's electricity sector (including Gujarat) have mandated that the regulators shall ensure transparency while exercising

their powers and discharging their functions. If there is no transparency in the decision-making process, the credibility of the regulator is lost. Argentina's water regulator faced these problems as it did not have a transparent regulatory process.

These are two distinct approaches being followed in the regulations. A quasi-judicial approach is followed in all the proceedings of the electricity regulations in India, while the process is consultative (in cases other than dispute settlement) in the case of the telecom regulator. The consultative process is preferable to formal hearings in as much as it provides for a comprehensive discussion of issues with different stakeholders and, thus, is less costly and less time consuming. In formal hearings, which are based on written submissions, there is a danger that the discussion may become adversarial rather than consultative. However, there are some areas such as dispute settlements, which necessarily have to be resolved through a quasi-judicial process. Thus, a case lies in demarcating the areas where the regulator should follow the process of hearings in decision-making. The areas should be restricted to those where the decision of the regulator requires imposition of a penalty or involves an award in favour of one party and is, therefore, judiciable. In other cases, the consultative processes should be encouraged.

An appeal against a decision must be to an independent body and must be on a question of law. The appellate authority should not deal with the substance of the regulatory decisions unless the evidence presented or the procedure adopted shows that regulatory decisions are unreasonable. The appellate authority could be the High Court or a Tribunal with quasi-judicial powers.

In addition, there should be a legislative scrutiny of the regulator's activities, as well as external scrutiny by, say, the C&AG (Controller and Auditor General) of India of the regulator's accounts and expenses. However, the extent of legislative scrutiny has to be clarified. The Annual Report on the regulatory activities should be tabled before the legislature. And the legislature should refrain from any substantive discussion on regulatory decisions, which have been arrived at through a transparent as well as consultative process. Similarly, care should be taken to ensure that external scrutiny by the C&AG should not also extend to substantive regulatory decisions, but be restricted to accounts and expenses incurred by a regulator.

Table 6.5 Accountability parameters - international experiences

PSP option	Country	Regulatory agency	Accountability parameters
Management contract	Trinidad & Tobago	PUC [a]	• Decision making process quasi-judicial
Concession	Buenos Aires	ETOSS [b]	• Lack of transparency in decision making process • Judiciary can hear an appeal for any conflict between a regulator and the regulated entity. But Judiciary is vulnerable to political influence • Ad hoc nature of intervention by executive branch of the Government
Concession	Chile	SSS [c]	• Regulatory process transparent and decision making rule-based • Appeal to regulator on dispute regarding tariff within 30 days. If it fails, a panel of three arbitrators decides within 37 days. Decisions can be appellable to court
Concession	Bolivia	SDA [d]	• Decisions of SDA is appellable to General Superintendency, a supervisory body for all sectoral regulators
Divestiture	England & Wales	OFWAT [e]	• The decision of the regulator is appellable to competition commission • Report of the regulatory activities be laid down annually before the Parliament • Decision making process consultative

[a] Public Utilities Commission; [b] Ente Tripartite de Obras de Servicios de Saneamiento;

[c] Superintendent of Water and Sewerage Services; [d] superintendencia de Aguas; [e] Office of Water Services

Recommendation17

- The authority should ensure transparency during the regulatory process.
- The WRA should undertake judicial proceeding only while discharging its dispute settlement function.
- An appeal against the decision of the WRA must be to an independent body and should be on a question of law. The appellate authority could be a High Court or a Tribunal in Gujarat with quasi-judicial powers.
- The authority[31] should maintain proper accounts, and prepare an annual statement of accounts in such form as may be prescribed in consultation with the Comptroller and Auditor-General of India.
- Its accounts should be audited by the Comptroller and Auditor General of India.
- Its accounts must to be certified by the Comptroller and Auditor-General, and shall be forwarded annually to the State Government by the authority. The State Government shall cause the audit report to be placed/labelled, as soon as may be after it is received, before the State Legislature.
- The authority shall prepare, once every year, in such form and at such time as may be prescribed, an annual report including a summary of its activities during the previous year and copies of the report shall be forwarded to the State Government. A copy of such report should be labelled before the State Legislature.

Powers of the authority

In areas where issues are required to be resolved through adjudication, the regulator should be deemed to be a civil court and a quasi-judicial authority. It would require to have the authority to summon and enforce attendance, require disclosure and production of documents, receive evidence on affidavit, review its decisions, etc. For discharging its functions, the regulator would also require to have the powers to call for information and conduct investigations. Further, it would require sufficient powers to prosecute for the contempt of the lawful authority of a public servant, for offences against public justice, and for offences relating to documents given as evidence. The regulator being a quasi-judicial body, would require to have the powers to pass interim as well as final orders. In the first instance, it may make an interim order and may reserve its decision pending further proceedings. The orders and directions of a regulator must be enforceable in a court of law. In addition, every order passed by the authority should be deemed to be the decree of a civil court and be executable as such. If the directions or

[31] Authority and WRA have been interchangeably used.

orders of the authority are violated, the violation should be adequately punishable with suitable fines. Regulatory authorities in different countries (Table 6.6) have been given the necessary powers to impose penalties for non-compliance of orders of the regulatory authorities.

Table 6.6 Powers of regulators - international experiences

PSP option	Country	Regulatory agency	Powers of Regulators
Management contract	Trinidad & Tobago	PUC [a]	• NA
Concession	Buenos Aires (Argentina)	ETOSS [b]	• Fines up to $100,000 on failure to provide requested information and reports • Fines of $500,000 on failure to supply services or meet quality standards and violation of tariff rules • Fines ranging from $100,000 to $1 million for delay in fulfilment of agreed five-year investment plan
Concession	Chile	SSS [c]	• Fines can be imposed for failure of submission of regular information to the regulator • Fines up to $80,000 for providing false information • Fines up to $50,000 for providing poor quality of water
Concession	Bolivia	SDA [d]	• Can impose fines for non compliance

[a] Public Utilities Commission; [b] Ente Tripartite de Obras de Servicios de Saneamiento;
[c] Superintendent of Water and Sewerage Services; [d] superintendencia de Aguas; [e] Office of Water Services
NA - Not available

Recommendation 18

1. The WRA should have adequate power to ensure compliance of its order and 'directions'. If these are violated, there should be adequate punishment.
2. If an offence is committed by a company, then the person in charge for the conduct of the company would be liable.
3. The Authority shall, for the purposes of any inquiry, have the powers of a Civil Court while trying a suit, in respect of the following matters, namely a) summoning

and enforcing the attendance of any witness and examining him on oath, b) requiring the discovery and production of any document or other material object producible as evidence, c) receiving of evidence on affidavits, d) requisitioning of any public record or a copy thereof from any court or office, e) issuing commissions for examination of witnesses or documents, f) reviewing of its decisions, directions and orders.

5. The provisions of the Code of Criminal Procedure, 1973 relating to searches shall apply so far as may be to the search made. The authority may call upon the specified Government Company or any person to furnish to the authority periodically, or, as and when required, any information concerning its or his activities related to water supply. The WRA should have full powers under Section 195 of the Criminal Procedure Code to prosecute for contempt for lawful authority of public servants, etc.
6. The WRA should have full powers under Chapter XXVI of CrPc (Code of criminal procedure) in regard to offences affecting the administration of justice.

Miscellaneous

In India, the Government's approach to statutory regulation is based on the notion that a regulator, while being autonomous, should be accountable for its actions and should also be subject to the policy of the Government. The policy directives of the Government should conform to the objectives of the relevant regulatory legislation. These directives should relate to policy and not to administrative and technical matters. Whenever the Government decides to issue policy directives, it must consult the autonomous regulator before such directives are issued. It is equally important that the directives issued and reasons behind them should be made public. However, in case of dispute, the Government decision should be final.

Recommendation 19

The WRA should be subject to the policy direction of the Government. The policy direction should be consultative, reasoned and transparent. In case of dispute, the Government's decision is final.

Recommendation 20

State Government should have the following powers to determine:

- the salary, allowances and other conditions of service of the members.
- the form and the manner in which and the authority before whom the oath of office and secrecy.
- the form in which and the time at which, the WRA shall prepare its budget.

- the form in which the annual statement of accounts is to be prepared by the WRA.
- the form and the time within which the annual report shall be furnished.
- any other matter which is to be, or may be, prescribed, or in respect of which provision is to be made by rules.

Recommendation 21

The WRA should make regulations on the following matters.

- The salary, allowances and other conditions of service of the employees.
- Terms and conditions of consultants.
- The manner in which the charges for water are determined.
- The manner in which the quality of service are determined.
- Any other matter which is to be specified for carrying out its activities.

7 Framework for tariff regulation

Introduction

Water is often regarded as a social good and the charging for water in the past has always been driven by the Government's social policy. Even in developed countries like the United Kingdom, where significant parts of the industry have been privatized, the government continues to have a substantial role in the pricing.

In many parts of the world, it has been observed that political interference in pricing results in low-level equilibrium[32] of low coverage, limited investment and poor quality service. Low-level equilibrium is often associated with high social costs, which includes a negative impact on public health. It also causes consumers to invest in generating private supplies at high cost and resulting in environmental damage.

In recent times however, there has been a noticeable trend to introduce reforms in several countries including United Kingdom, Chile and Mexico. While different strategies have been followed in different countries, limiting the role of government in pricing is the key element of the process. Even within India, there have been attempts to reform and introduce private sector participation in Chennai, Tirupur and Bangalore. The fundamental rationale for reforming institutions in the sector, as stated in earlier chapters, is to overcome the demand-supply mismatch, to improve the quality of service and efficiencies, and to reduce the financial burden on the government.

The Government of Gujarat has formulated a Water Supply Master Plan to deal with the problem of water scarcity. As part of the master plan, it is envisaged that private sector will play a role in the development of the sector. The involvement of the private sector would necessarily imply creating an enabling environment to attract investments in the sector. This would mean changing the existing legal, regulatory, financial and administrative framework to facilitate private sector participation. Providing adequate returns through building in a tariff would be essential to attract private sector players.

In the context of Gujarat, the design of the pricing regime will involve political, social and economic challenges. Among these, the most important would be political

[32] Spilled Water, Institutional Commitment in the provision of Water Services, Edited by William Savedoff and Pablo Spiller, pp. 13

willingness and commitment towards reform. Further, it would require legislative changes to ensure smooth transition and functioning under the new environment.

The proposed regulatory framework (as discussed in Chapter 6) would involve devolution of tariff-setting to an independent regulator to meet the objectives of improving efficiencies and to bring about transparency and objectivity in the process of tariff determination. This is necessary to provide comfort to the potential investors about commitment to reform. The scope and role of the regulator vis-à-vis the government and the municipal bodies would need to be determined.

Review of the existing price regime

The pricing of water in Gujarat is currently under the purview of the government and the municipal bodies. These include Municipal Corporations in the six urban areas of Ahmedabad, Vadodara, Rajkot, Jamnagar, Surat and Bhavnagar, the municipalities (serving some of the other urban areas) and the Gujarat Water Supply and Sewerage Board and other local bodies. Specific powers have been provided to these bodies through the existing legislation to determine the price at which water will be supplied.

There are primarily three ways in which the pricing of water is currently done. These are:

- through a tax assessed on the basis of rateable value (determined on the basis of market value of land, age of the building, type of building, etc.) of a building or property.
- on volumetric basis by measurement of actual consumption (using meters) or based on the assessed consumption calculated from the size of connection.
- a flat rate levied as a minimum charge.

It is understood that most consumers in the State pay for water in the form of a tax or a minimum charge and less than 10 percent (an estimate[33]) pay based on the actual or assessed consumption. Such a system of pricing results in a number of distortions, which are discussed below.

1. Pricing which is not related to actual consumption is inherently inefficient since it provides no incentives to consume at optimum levels.
2. The current pricing structure does not bear any relation to the cost of providing the supply and service and, hence, does not provide any signal to the consumer about the value of demand placed on system due to consumption.

[33] In Ahmedabad 4.0%, and in Rajkot 0.4%

3. The prices do not bear any relation to the quality of supply and the efficiency of the serving utility and, hence, provide no incentive to the utility to improve its performance.
4. It also creates a problem of inequity, because different areas (within the same utility as also across different utilities) may be supplied with varying quantity and quality of water, while the charges are related to the value of property or a flat rate is levied. Hence, it is possible that consumers being provided low quantity or consumers with lower ability to pay, may actually be cross-subsidizing those consumers who are being provided with better quality and possess higher capability to pay.
5. The current system of functioning of the municipalities and local bodies is not based on commercial principles and there are no clearly defined accounting procedures. This results in lack of information on the cost structures as well as adequacy of charges for different services because –
   a) Municipalities and local bodies have multiple functions and it is not possible to determine the proportion of total cost incurred in providing each of the services that they are required to.
   b) Since property tax is a composite tax for multiple services bunched together, it is not possible to determine the proportion of costs recovered for each of the services rendered. Further, it is likely that some services may be overpriced while others are underpriced.

Besides the structural problems mentioned above, the pricing of water in Gujarat has always been a socio-political exercise rather than an economic one. It is understood from discussions that, in rural areas supplied by GWSSB, not more than 10 percent of the cost of providing water services is recovered through water charges. This has, over a time period, resulted in insufficient funds being made available for expanding the system and contributed to declining availability and poor quality of supply and service. Low availability has also resulted in water being sold by private firms at exorbitant prices[34] (much higher than the actual cost of supply). More often than not, this results in exploitation of those with limited resources and capability to pay, thereby defeating the purpose of keeping the prices very low while at the same time generating undue profits for those with resources to exploit the situation.

Further, it has also resulted in over exploitation of the ground water resources for irrigation and commercial purposes. The over exploitation of ground water has on the one hand caused depletion of the water table and on the other resulted in increasing

[34] This phenomenon is widespread in the State. Sale of water for domestic and irrigation purposes occurs commonly.

amounts of electricity being used for irrigation purposes (and resulting distortions in the electricity industry).

Price regulation in Gujarat

As stated earlier, investments in the water sector are characterized by large sunk costs and economies of scale. Further, access to water is often considered as a social goal and service. Since water is consumed by the population at large, water charges have been used as a tool for political mobilization by keeping prices artificially below the cost of supply.

Traditionally, investments in the sector have been financed by the governments. However, since the charges were not sufficient to cover the costs, it has been increasingly difficult for the government to fund new investment. This has resulted in low coverage and poor quality of service. Since the consumers are dissatisfied with such service, there is a strong opposition to increasing prices. They are however, generally, willing to pay for assured and good quality of supply[35].

Introducing private capital into the sector is a definite way to fund new investments and to improve the efficiencies. However, given the huge sunk costs and the opportunistic pricing policies, private firms need a firm assurance that they will be able to recover the investment and also able to cover reasonable operating costs.

The primary rationale for introducing an independent regulatory framework is to develop a mechanism to provide comfort to potential investors by limiting the government discretion in price setting. Creation of an independent regulator with power to set the tariff[36] is considered as the best possible means to assure the private sector of the Government's commitment to the introduction of a rationale pricing regime.
It is interesting to note that such institutional reform is already underway in a number of countries[37] and also within the country, including Gujarat. The Government of Gujarat, in December 1998, created the Gujarat Electricity Regulatory Commission and provided it with a number of powers–including that of determination the tariff for electricity for all consumer categories and for granting of licenses. Since then, the GERC has started functioning effectively and issued its first tariff award in October 2000. Smooth implementation of the award has demonstrated three clear advantages of tariff determination through independent regulatory process.

1. The willingness of polity to accept the tariff determined through techno-economic regulatory procedure.

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[35] As evident from the purchases effected from the open market, generally at a high premium.
[36] Often in consultation with the Government
[37] Annexure 7.1 provides the details in this context

2. The ability to create pressure on utilities to improve efficiency and quality of supply and service through internalization of these concerns in explicit and quantifiable manner.
3. The better acceptability by consumers of tariff determined through a transparent and participatory process.

It is evident that creation of independent regulatory authority for water sector is expected to yield similar benefits. It will also facilitate private sector participation and lead to required investments.

The creation of an independent regulator would obviously require a change in the existing legislation or the introduction of a new legislation. While it may be politically and administratively easier to amend the existing legislation, it is often desirable to introduce a new legislation for various reasons, discussed in Chapter 6.

The design of the regulatory framework needs careful consideration. It is considered desirable that substantive constraints are placed on regulatory discretion. This is required to reduce the regulatory risk and can be achieved by detailing in the enabling legislation the objectives and the principles, definition of variables and the process to be followed for tariff setting.

As discussed above, under the existing system retail pricing is under the purview of municipal corporations, municipalities and local bodies. They are also the suppliers of services and clearly these powers will have to be transferred from these bodies to the regulator. This will ensure separation of the role of the supplier and the regulator. Currently, there are no transfer prices for bulk transportation of water in Gujarat. However, with the creation of the GSWIDCL (Gujarat State Water Infrastructure Development Company Limited), it will be necessary to establish a scheme for bulk pricing.

The following role for the WRA has been (details are available in Chapter 6) suggested for the purpose of tariff determination.

Regulator's role

It is suggested to phase-in the role of regulatory body into two distinct phases which will be sequential. During the first phase, the focus will be on development of regulatory capacity and in undertaking the basic tasks essential for full-fledged regulatory intervention in the second phase. This phasing process is provided to ensure smooth transition while simultaneously maximizing the economic gains. The Phase I will last three years and the role of regulator under this phase is defined as follows.

Phase I: Development phase

This phase will start from the date of creation of the regulatory authority and vesting of power in it to determine the tariff. During this Phase-1, the regulatory authority will

1. Prescribe the principles to be used for tariff determination. This will be done through a transparent and participatory process.
2. Conduct cost of service study to assess the extent of subsidy and cross-subsidy in the prevalent tariff structure.
3. Formulate a plan in consultation with the State Government to optimize the subsidy requirement and the delivery mechanisms.
4. Rationalize the retail tariff, in the areas indicated by the Government of Gujarat, to meet all justified expenditure on operation and maintenance within the Phase I. The operation and maintenance (O&M) expenditure would include the cost of repair, maintenance, administrative costs and the employee costs. This would imply that from the existing level, the tariff would be increased to cover 100% of the justified O&M expenditure within three years of Phase I. It is suggested to phase the increase as 50 percent, 25 percent and 25 percent in year 1, year 2 and year 3 respectively. This rationalization would be done on the basis of information provided by the utilities.
5. Develop skills and expertise to undertake detailed regulatory reviews and issue orders in a transparent and efficient manner.

Phase II: Execution phase

a) Direct regulation for determination of bulk prices in all cases and, for retail prices, in the areas to be declared by the Government of Gujarat. It is suggested that the regulator may determine the retail prices in the six municipal corporations. This would imply that the regulator would actually determine the set of prices at periodic intervals. The concerned utility shall be required to file with the regulator an application seeking an amendment in the tariff structure.

b) Indirect regulation for retail prices in areas other than the six municipal corporations. The power to determine the tariff shall still be with the regulator but it shall be executed through local bodies. The regulator would specify the objectives, the principles and the procedure to be followed for the determination of the tariff. The local body, according to the specified formula would then determine the price. It would be necessary to file with the regulator, all necessary information whenever a change in the tariff is effected.

A two-tier regulatory structure has been suggested for the following reasons.

a) To reduce the regulatory burden that will be caused if the regulator were to determine the tariff for all local bodies because of their large numbers.
b) Since, during the initial phase, private sector participation can be expected in urban areas only, the issue of pricing is more relevant in these areas.

Tariff setting - principles, design, process and issues

Principles

Tariff determination is the primary tool available for creating an enabling environment for dynamic and sustainable growth in the water sector.

The fundamental principle of tariff determination is to ensure that prices lead to an optimum level of investment, operation and consumption in the sector. The principles that need to be considered while designing the tariff are detailed below.

1. To promote efficiency and economy in the activities of the sector – meaning:

- Only reasonable costs of operation will be allowed to be recovered from the consumers.
- To provide incentives through tariff for good performance and for improving the quality of supply and service to the consumers.
- That the tariff will be designed in a manner to promote an optimum level of consumption and avoid wastage of scarce water resources.

2. To secure the financial viability of the entities in the sector – meaning:

- The utility will be entitled to recover all reasonable costs incurred in operating and maintaining the water supply.
- The investors will be assured of recovering the capital costs including a reasonable rate of return on the investment.

3. To provide incentives for optimum investment – meaning:

- That the tariff structure and design will be such that it attracts the necessary investment to the sector.

4. The tariff should reflect the cost of supply of providing water – meaning

- That the consumers, to the extent possible, will pay according to the cost incurred in providing supply and service. Wherever the government wants a certain group of consumers to be subsidized, it will make a corresponding allocation from the State budget.

5. The tariff should be fair, just and non-discriminatory – meaning

- That the tariff would not discriminate against any consumer(s) so as to burden them with unjustified costs.

6. The tariff structure will be unbundled to reflect the cost of providing different services – meaning:

- To the extent possible, the tariff structure would be unbundled i.e., cost of providing different services will be shown separately.

7. That the tariff, to the extent possible, should be simple and easy to understand and implement.

Tariff design

As discussed above, the regulator will have the responsibility of determining the tariff for bulk and retail supply. This section discusses the recommended tariff design philosophy and the associated regulatory process.

The tariff structure should normally consist of two parts:

a. Demand charge – The demand charge seeks to recover the fixed costs associated with the cost of providing supply[38]. The demand charge is sometimes known as the standing charge or the fixed charge. The fixed cost includes the following components.

   I. Interest costs
   II. Depreciation
   III. Reasonable return on assets

   The proportion of the fixed costs in the total cost, in case of the water sector is very high and, hence, it is possible to recover only a part of the fixed costs through the demand charges. Levying of the demand charge also secures the financial viability of the utility. This charge can be in form of a flat rate levied in Rs per month per consumer.

b. Variable charge – To recover the operation and maintenance costs and the balance of the fixed costs. This includes the employee cost, cost of repairs and maintenance etc. This charge can be levied in form of Rs per KL consumed by the consumer.

[38] Recovery of fixed cost is a standard practice in all infrastructure sectors. Even for the water sector, the Ninth Five Year Plan recognizes the concept of recovery of capital cost from the consumers (Ref. Section on Drinking Water [Rural], Ninth Five Year Plan, Vol. II, pp. 271).

The following paragraphs discuss the design for bulk and retail tariff separately.

Bulk supply tariff

The bulk supply tariff constitutes the cost of capturing, storing and the cost of transporting water in bulk. The primary cost in the bulk supply tariff, is the fixed cost in form of the capital investment. This may in fact form close to more than 50 percent of the total cost of supplying water.

Following recommendations are made for design of the bulk supply tariff:

a. The principle of marginal cost should form the basis of designing the tariff.
b. Performance-based tariff design should be followed with efficient utilities being rewarded and inefficient utilities being penalized. Design of performance-based tariff would need careful consideration of the fact that the bulk supply companies may supply either through the canals or by pipelines. Further, it would also require identification of suitable parameters for measuring performance which can include the amount of water lost in transit, the employees per million kiloliters transmitted etc.
c. The bulk supply tariff should be designed as a two-part tariff consisting of a fixed charge and a variable charge. The fixed charge can be designed to recover a part of the fixed costs while the balance fixed costs can be recovered through the variable charge.
d. The variable charge should be linked to the actual metered consumption of water.
e. Tariff design should protect the financial viability of the utilities in case of reduced availability of water due to reasons beyond control and also allow for adjustments due to inflation.

Retail supply tariff

The regulator would determine the retail tariff in the areas prescribed by the Government of Gujarat and would prescribe the principles to be followed in case of other areas. It is suggested that the consumers may be categorized in three broad segments as below.

i. Domestic - comprising of households
ii. Public institutions - comprising of public services like educational institutions, hospitals, places of worship etc.
iii. Commercial - comprising of industries, office complexes, shops etc.

Following recommendations are made for the design of the retail supply tariff.

a. The principle of marginal cost should form the basis of designing the tariff.

b. Performance-based tariff design should be followed with efficient utilities being rewarded and inefficient utilities being penalized. The relevant performance parameters could be the amount of water losses, number of employees per thousand consumers, water pressure, percentage of billing and collection etc.
c. All consumers should be charged on the basis of actual metered consumption. Wherever meters are currently not available, the consumers would be charged on the basis of assessed consumption estimated from the size of the connection. It would be ensured that sufficient incentives are provided through tariffs for consumers to opt for meters.
d. The tariff should comprise of two parts i.e., a demand charge and a variable charge[39].
e. The demand charge as well as the variable charge should be different for the three consumer categories mentioned above.
f. The tariff should comprise a reasonable number of slabs with successively higher charges in the higher blocks.
g. There should be a lifeline rate for marginal consumers. This can be provided through a targeted subsidy scheme supported by the government.

Regulatory process

This section discusses the regulatory process and related issues in context of tariff determination by WRA.

The regulator is expected to prepare the framework for tariff regulation, which includes the principles to be used, guidelines for filing of proposals, information requirements of the regulator etc.

In case of the water sector in Gujarat, two different processes, one for the utilities regulated directly and another for the utilities regulated indirectly are proposed. The following approach is suggested, during the Phase II, for utilities under direct regulation.

a. The utilities would prepare and submit a tariff proposal to the regulator. It is suggested that the frequency of tariff review be every five years. The longer duration between successive filings is conducive for performance-based tariff setting and provides a stable regulatory framework thereby reducing the risk profile. It also leads to stability in the tariff. Long duration tariff review period also has the benefit of a reduced regulatory burden. The detailed regulatory procedure is discussed later.

[39] It may be noted that water as a commodity is not be charged. This is because of two reasons. One, estimating the economic cost of water supply would be difficult at present. Second, even other components in the cost of water supply, which are direct costs of supply as opposed to the economic cost of water, are currently not being recovered as part of the water tariff.

b. It would be possible to adjust the tariff, on a yearly basis, to reflect changes in the inflation level, and the price of major inputs like electricity etc. The regulator will determine the formula and procedure for such review and the utility will approach the regulator every year for such an amendment. It would not be necessary to follow the complete regulatory procedure for the annual review.
c. The regulatory procedure for utilities regulated directly would typically comprises four steps, discussed below.

Step-1: Filing tariff proposal

The first step in the process is preparation of a tariff proposal by the utilities as per the guidelines specified by the regulator. The tariff proposals will have to include the details of technical, operational and financial parameters and any other related data that may be required by the regulator.

Step-2: Review of the tariff proposal by the Commission

The regulator would examine and analyze in detail the proposals submitted by the entities. The regulator would have the authority to ask for further information and also to require the utility to produce such documentary or other evidence, as it may consider necessary.

After being satisfied that all relevant information, as required, has been provided, the Commission shall require the entity to issue an advertisement in the newspaper calling for responses and comments from the public on the tariff proposal. Normally, the Commission will give approximately four to six weeks for inviting public responses.

The respondents to the tariff proposal are required to submit a copy of their comments to the regulator as well as to the concerned entities. Before the Regulator can take up the public hearings, the entities are required to prepare answers to the comments provided by the respondents.

Step-3: Public hearings

The regulator will conduct public hearings on the tariff filing made by the entities after receiving the responses from the public and subsequent replies from the concerned entity. The hearings provide a different sections of consumers an opportunity and a forum to express their views and concerns on the subject.

The regulator would have the authority to determine the stages, the manner, the place, the date and the time of the hearing, as it may consider appropriate. The public hearings can last for three to eight days depending on the number of respondents and the process adopted by the regulator.

The regulator would consult the Advisory Committee on the tariff proposal and would have the flexibility to consult the Government as a part of the public hearings or otherwise, before the award of the tariff order.

The tariff determination process should be consultative, rather than quasi judicial.

Step-4: Award of the tariff order

The regulator will, after taking into consideration the facts presented by the entities and the submissions made by the respondents and submissions during the public hearings, provide its ruling on the matter.

The regulator would have the authority to pronounce judgement at once after the hearing, or on some future date as may be practical. The judgement will have to be pronounced in an open court and shall contain counter statements of facts in brief, the points or issues for determination, decision thereon and the reasons for such decisions. The regulator is expected to provide a detailed written order along with the judgement containing the facts of the case, the Commission's analysis and the reasons for the decisions.

The enabling Act would normally specify a time frame for completing the whole process. It is suggested that duration of four months may be provided for completing the regulatory process of tariff determination.

2. Utilities under indirect regulation

In case of utilities regulated indirectly a different approach would be required during Phase II. Following recommendations are made in this case.

a. The utilities will not be required to file a tariff proposal to the regulator but instead would have to complete all the details as per the guidelines and formats specified by the regulator. A time frame of five years is suggested as in the case of utilities regulated directly for similar reasons.
b. The details would have to be filed with the regulator at least four months before the intended date of the tariff revision.
c. The regulator would analyze the details and, if required, after holding a negotiation, on performance as well as other parameters, with the concerned utility, arrive at the tariff.
d. It would be possible to adjust the tariff, on a yearly basis, to reflect for the changes in the inflation level, and price of major inputs like electricity etc. on the basis of approach determined by the regulator.

Issues in tariff setting

The process of regulation and tariff determination as outlined above would imply a number of operational and managerial systems including information and accounting procedures, subsidy allocation from the government etc. These issues along with the recommendations are discussed below.

Accounting procedures and information systems

Currently, the supply of water and related services are provided by the municipal corporations, municipalities, GWSSB and other local bodies. These organizations have multiple functions including providing for sanitation services, maintenance of roads and streets etc.

The existing accounting systems of these organizations do not have provision for segregating the costs related to providing each of these services. Hence, it is not possible to determine the cost of providing water as also that of any other service.

A move towards cost-based tariff setting would necessarily entail information on the cost of supply. Hence, it is necessary that accounting procedures be geared so that the calculation of cost of supply is possible. This would obviously involve separation of the expenditure incurred as also the revenue earned from providing the supply of water.

The process of tariff determination by a regulator is a data intensive process requiring information of various aspects of utilities' operations. While the data requirements may differ on the basis of approach to be adopted by the regulator, efficient tariff setting without good data is not possible. It is also important to note that the availability of data would also influence the choice of approach for tariff determination. It is important that as part of the reform exercise, appropriate systems be put in place to ensure that the process of tariff setting is not distorted by lack of information and data. It is, hence, recommended that the utilities should be geared to meet the information requirements of the regulator. In this context, it would be appropriate to define a transition strategy and a long-term strategy charting out the steps required to achieve the required level of information systems.

Metering

As mentioned above, most of the consumers in the State are not metered and are charged on the basis of rateable value of property or a flat rate. Such tariff structure which does not take into account the actual consumption provides no incentive to the consumer to use the scarce resource in an optimum manner. Hence, such tariff is inherently inefficient and leads to distortions at two levels. One, it does not recover the cost of supply from a substantial number of consumers and two, it leads to waste and hence deprives other consumers of even the minimum needs.

It is recommended that the regulator is empowered to ask the utilities, under direct as well as indirect regulation, to prepare a detailed metering plan and update the regulator on the same on a regular basis metering of all consumers. Given the existing legal provisions, any move towards metering would require amending these provisions. These changes are discussed along with the discussion on other legislative changes required in Chapter 9.

Subsidy support

Wherever the local bodies, due to their social policy, desire that a particular class of consumers be supplied at tariffs below those determined by the regulator, it is recommended that the allocation for the same should be made explicitly in the local bodies' budget.

The need for subsidy should be assessed rather than just assuming that it exists, because the inclusion of unintended beneficiaries reduces the efficiency of the subsidy and increases the burden on the taxpayer. It is important that the subsidies be well targeted and the inclusion criteria be such that it minimizes unintended beneficiaries. A proper assessment of the subsidy need and the willingness and capability to pay is required. However, design of complex inclusion criteria often results in high administrative costs of running the subsidy scheme. It may thus be desirable to jointly administer several subsidy schemes so that the administrative costs can be shared.

The provision of subsidy may also result in inefficient use of resources, in this case water, particularly when the subsidy is designed to cover either the full cost of the service or consumption at all levels or both. It is, hence, suggested that the consumers be required to pay a part of the total cost. Further, it is also important to cap the subsidy at minimum basic level of need.

Willingness to pay for water in Gujarat

This section very briefly discusses the willingness to pay (WTP) for water in Baroda city in Gujarat based on a study carried out by the Human Settlement Management Institute[40] in 1998. The study used the contingent valuation technique for estimating the WTP in the household sector. The main findings of the study are listed below.

I. Almost 80 percent of the households expressed that they would continue using the water from a house connection, even when the monthly charges were increased nearly three times (from eight rupees per month to Rs 25 per month).

[40] Located at the Integrated Office Complex, Hudco House, Lodhi Road, New Delhi 110 003

However, the percentage who would still use water from a house connection at Rs 40 per month and at Rs 60 per month declined dramatically to 35 percent and 9 percent respectively.

II. The WTP as percentage of household income is quite low and varies from 0.55 to about 2.0 percent of the total household income.

III. More than 62 percent of the households are willing to pay up to Rs 25 for improved water pressure.

IV. More than 60 percent of consumers are willing to pay additional monthly charges for additional water supply for four hours a day.

V. About 30 percent of the households desired to have a metered supply to their household.

While there are some indications from the above study that consumers would be willing to pay higher amounts, especially when supplied for longer hours and better quality of supply, it is difficult to arrive at conclusions from the same. This is so because of the following reasons.

a. The WTP would vary in different regions of the State depending on the economic parameters as well as the quantity and quality of water available.

b. The scope of the current study was limited to households only.

It is, hence, suggested that a detailed study covering different regions of the State may be initiated in order to assess the WTP among different consumer categories.

Conclusion

The pricing of water in Gujarat has been a function assigned to the municipal and local bodies. Under the existing structure, most consumers pay according to the rateable value of their property (or a flat rate) and the actual consumption is not measured. Such structure has resulted in a number of distortions, including promoting inefficient use and also raises questions of equity. The pricing has been a function of the social policy with little relation to the cost of supply. Further, given the accounting procedures and the information systems it is not even possible to calculate the cost of supply.

It has been increasingly difficult for the municipal and the local bodies to fund new investments. The Government of Gujarat has, hence, envisaged a role for the private capital in the water sector. Such a trend is visible in a number of countries as also in some parts in India, notably in Chennai, Tirupur and Bangalore.

Attracting private capital would, however, require legal as well as institutional changes. The primary requirement would be to set up an independent regulatory body with authority to determine tariffs. It is recommended that the regulator should be

established through the enactment of a new legislation so as to demonstrate firm commitment to price reform. The two-tier regulatory structure is suggested with direct regulation in case of bulk supply, and for retail supply areas determined by the government. For other areas, the retail supply tariff would be regulated indirectly with the regulator prescribing the principles etc. and retaining the right to seek all necessary information.

The principles for determining the tariff have been prescribed in the chapter and it is recommended that the same may be incorporated in the proposed legislation. It is recommended that the tariff structure should provide signals for optimum consumption and also the value of consumption at different times. The tariff should be designed to have a demand charge and a variable charge. All consumers should be metered and tariff should act as an incentive to the consumers to move toward metered consumption.

It is often assumed that the price of water needs to be subsidized without determining the willingness to pay. It is recommended that the need for subsidy be assessed rather than assumed. Further, the subsidy scheme needs to be well designed so as to exclude unintended beneficiaries, minimize the administrative cost and retain the incentives for optimum consumption.

Annexure 7.1: Review and analysis of price reform in different parts of world

This section, in brief, describes the international trend in regulatory reform in the water sector. The discussion is, however, limited to pricing of water and related issues.

The responsibility for providing water services has traditionally been vested with public sector organizations because of the characteristics[41] of the sector, which make functioning of competitive markets difficult. There has, however been a distinct trend towards regulatory reform in many countries including Chile, United Kingdom, Argentina etc. The reform has been driven by several factors including water shortages, unmet demand, inefficient operations and financial problems. Further, the reform has progressed at a different pace in different countries and has also been characterized by varying approaches[42].

Chile

In Chile, low tariff and resulting financial problems for the State-owned Santiago Metropolitan Sanitary Works Enterprise (EMOS)[43] was one of the key factors leading to reform. The tariff was substantially below the marginal cost leading to under investment in maintenance and expansion. Reforms were initiated in 1988 and though the initial intent was to privatize EMOS, as the first step its status was changed from an autonomous entity under the public law to a State owned corporation under private commercial law. The key features of reform, in context of tariff determination, are listed below.

1. The regulatory functions were transferred from an autonomous public entity to a regulatory body attached to the Ministry of Public Works. The regulatory body was assigned the functions of tariff determination, enforcing technical standards and granting concessions for water supply.
2. The enabling legislation describes in detail the formulae and variables to be used for the purpose of tariff determination, thereby reducing the regulatory risk.
3. The tariff is calculated once in every five years to cover the long run marginal cost and then readjusted to cover the long run average cost and allow at least 7 percent return on the capital.
4. The tariff is determined through a process of yardstick competition by comparing the firm's performance with that of an efficient firm. The tariff is also indexed to a

[41] large sunk costs and economies of scale

[42] due to different circumstances and also political commitment

[43] EMOS was otherwise one of the better managed utilities with almost all connections being metered and bill collection rate of over 80 percent.

price index. Hence, a performance-based tariff setting methodology is followed. The firm is entitled to retain additional profits accruing out of better management. The employees had an incentive to increase returns since they were allowed to retain an equivalent of 10 percent of the profits for the first five years of reform.

5. The companies can appeal the decision of the regulator and a process for the appeal is specified.
6. The companies are required to file with the regulator on a regular basis, the information on cost and service. Companies failing to do so can be fined. This has resulted in better accounting policies and substantial increase in the information available compared to the pre-reform period.
7. The impact of tariff increase on poor households was mitigated through a well-targeted subsidy scheme.

United Kingdom

In UK, the Office of Water Services (OFWAT) established in 1989 is responsible for regulating the water industry, which was, privatized in 1989. Privatization of the industry was one of the key drivers of the reform process. The functions of OFWAT include setting price limits, ensuring standards of service, promoting economy, efficiency and competition, publishing information on industry performance and dealing with complaints and disputes. The key features in context of tariff determination are detailed below.

1. The process of tariff determination is carried out once every five years. However, the Water Industry Act 1999 introduced annual regulation of tariff structure in addition to five yearly regulation of price caps. The prices are set as caps with companies free to offer lower rates.
2. The process involves extensive consultations with all stakeholders including the government. This is carried out through issue of consultation papers issued by the regulator setting out various issues relevant to the tariff determination[44].
3. There is a considerable focus on the quality of supply and service in the process of price setting, which takes into consideration the new investments, required for meeting the standards.
4. The government ensures that vulnerable consumers are protected.

Honduras

The strategy for reform in Honduras was agreed upon in 1994, with the assistance of the World Bank etc. Due to lack of political will the reform was not carried out and the

[44] Such an approach is possible as the consumers are well informed and the system makes available substantial information, which helps in providing inputs into the tariff determination process.

sector continues to be characterized by a number of problems including welfare loss arising from non-availability of water to poorest households. The main features of the reform envisaged in 1994 are as follows.

1. Creation of an independent regulatory body.
2. Regulator to establish norms for calculating rates on a cost plus basis using a model firm and cost of inefficiency not to be passed though.
3. Municipal bodies to be allowed to cross-subsidize within the water rates but not with other services.
4. Regulator would be free to declare self-regulatory system for smaller systems.
5. Access to public resources was made conditional on compliance with recommended practice on rate setting.

8 Framework for water quality

Introduction

The criteria of water quality has become an important and sometimes controversial issue of the water supply field. As our ability to measure and treat trace quantities of contaminants in water improves and our knowledge of the health effects of these compounds increases, we are faced with increasingly stringent water regulations and consumer pressures. The regulations are vitally important for a number of reasons. Standards affect the selection of raw water sources, choice of treatment processes and design criteria, range of alternatives for modifying existing treatment plants to meet current or future standards, and treatment costs. Public health engineers associated with drinking water quality are required to be aware of regulatory requirements so as to design treatment plants in accordance with much higher acceptability standards.

The water quality regulatory process includes the following series of logical steps:

1. Beneficial use designation
2. Criteria development
3. Standard promulgation
4. Goal selection

Beneficial use designation

Surface and ground waters are typically designated by a state water pollution control agency for beneficial uses such as municipal water supply, industrial water supply, recreation, agricultural irrigation, power and navigation, and protection or enhancement of fish and wildlife. In India, the Central Pollution Control Board has developed various designated water use classes (Table 8.1). These beneficial uses are based on the quality of the water, present and future pollution sources, availability of suitable alternative sources, historical practice and availability of treatment processes to remove undesirable constituents for a given use.

Table8.1 Primary water quality criteria for various uses of fresh waters, as laid down by the Central Pollution Control Board

S.No.	Characteristics	A	B	C	D	E
1.	Dissolved oxygen (DO), mg/l, Min.	6	5	4	4	-
2.	Biochemical oxygen demand (BOD) mg/l, Max.	2	3	3	-	-
3.	Total coliform organism** MPN/100 ml, Max.	50	500	5000	-	-
4.	pH value	6.5-8.5	6.5-8.5	6-9	6.5-8.5	6.5-8.5
5.	Free ammonia (as N), mg/l, Max.	-	-	-	1.2	-
6.	Electrical conductivity, micromhos/cm, Max.	-	-	-	-	2 250
7.	Sodium absorption ratio, Max.	-	-	-	-	26
8.	Boron, mg/l, Max.	-	-	-	-	2

Use class: (A) Drinking water source without conventional treatment but after disinfection, (B) Outdoor bathing organized, (C) Drinking water source with conventional treatment followed by disinfection, (D) Propagation of wildlife, fisheries,
(E) irrigation, industrial cooling controlled waste disposal.
**If the coliforms are found to be more than the prescribed tolerance limits, the criteria for coliforms shall be satisfied if not more than 20 per cent of samples show more than the tolerance limits specified, and not more than five percent of samples show values more than four times the tolerance limits. There should be no visible discharge of domestic and industrial wastes into Class A waters. In case of Class B and C the discharge shall be so regulated/treated as to ensure maintenance of the stream standards.
Source CPCB Publication ADSORBS/3/1978-79

Criteria development

To protect given beneficial uses, water quality criteria are developed to define contaminant concentrations, which should not be exceeded. Until they are translated into standards through rule making or adjudication, criteria remain in the form of

recommendations or suggestions and do not have the force of regulation behind them. Criteria are developed solely on the basis of data and scientific judgement without consideration of technical or economic feasibility. Criteria are developed for different beneficial uses.

Standard promulgation

Once water bodies have been designed for specific beneficial uses and water quality criteria have been developed for those beneficial uses, the regulatory agency promulgates standards taking into account other factors such as economics and technical feasibility. Standards may take the form of (1) process specification or treatment (2) product quality specification and (3) a combination of the above.

The ideal method for establishing standards involves scientific determination of health risks or benefits, a technical/engineering decision of costs to meet various water quality levels, and a regulatory/political decision that weighs benefits and costs.

Goal selection

Water quality goals are contaminant concentrations, which an agency or water supplier chooses to achieve in order to ensure that it consistently meets regulated levels. Goals are typically more stringent than standards and include constituents not covered by regulations but of particular importance to the goal-setting entity. Decisions on setting goals involve determination of costs, benefits, and the overall philosophy or posture of a supplier.

Drinking water quality standards in India

In India, the drinking water quality standards have been formulated by different agencies i.e., the MUD (Ministry of Urban Development) (Table 8.2), BIS (Bureau of Indian Standards) (Table 8.4), and Indian Council of Medical Research. The WHO (World Health Organization) (Table 8.4) has recommended a set of drinking water quality standards, which also form a basis for the formulation of national standards in certain countries. The standards lay down the minimum requirements with respect to chemical and bacterial quality of water for domestic use which local authorities are expected to meet with. Neither of the Indian standards includes parameters like hydrocarbons, pesticides, certain heavy metals etc. that are an integral part of the WHO or EC (European Commission) standards. The MUD standards are usually a guideline but public health engineering departments in India are also following the BIS standards by their face value or in stringent form, if required. In case of private sector participation, as a uniform code of conduct, it is recommended that all stakeholders aim and achieve a final delivered quality of water that meets BIS standards. The scope of

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2.	Biochemical oxygen demand (BOD) mg/l, Max.	2	3	3	-	-
3.	Total coliform organism** MPN/100 ml, Max.	50	500	5000	-	-
4.	pH value	6.5-8.5	6.5-8.5	6-9	6.5-8.5	6.5-8.5
5.	Free ammonia (as N), mg/l, Max.	-	-	-	1.2	-
6.	Electrical conductivity, micromhos/cm, Max.	-	-	-	-	2 250
7.	Sodium absorption ratio, Max.	-	-	-	-	26
8.	Boron, mg/l, Max.	-	-	-	-	2

Use class: (A) Drinking water source without conventional treatment but after disinfection, (B) Outdoor bathing organized, (C) Drinking water source with conventional treatment followed by disinfection, (D) Propagation of wildlife, fisheries,
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Water quality goals are contaminant concentrations, which an agency or water supplier chooses to achieve in order to ensure that it consistently meets regulated levels. Goals are typically more stringent than standards and include constituents not covered by regulations but of particular importance to the goal-setting entity. Decisions on setting goals involve determination of costs, benefits, and the overall philosophy or posture of a supplier.

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quality analysis should also include other critical parameters listed by WHO / EC depending on local conditions.

Table 8.2 Physical and Chemical drinking water quality standards laid down by MUD

Sno.	Characteristics	Acceptable*	Cause for Rejection**
1.	Turbidity (Units on J.T.U. Scale)	2.5	10
2.	Colour (Units on Platinum Cobalt scale)	5.0	25
3.	Taste and Odour	Unobjectionable	Unobjectionable
4.	pH	7.0 to 8.5	<6.5 or > 9.2
5.	Total dissolved solids (mg/l)	500	1500
6.	Total hardness (mg/l) as ($CaCO_3$)	200	600
7.	Chlorides (as Cl) (mg/l)	200	1000
8.	Sulphates (as SO_4)	200	400
9.	Fluorides (as F) (mg/l)	1.0	1.5
10.	Nitrates (as NO_3) (mg/l)	45	45
11.	Calcium (as Ca) (mg/l)	75	200
12.	Magnesium (as Mg) (mg/l)	30	150
13.	If there are 250 mg/l of sulphates, Mg content can be increased to a maximum of 125 mg/l with the reduction of sulphates at the rate of 1 unit per every 2.5 units of sulphates		
13.	Iron (as Fe) (mg/l)	0.1	1.0
14.	Manganese (as Mn) (mg/l)	0.05	0.5
15.	Copper (as Cu) (mg/l)	0.05	1.5
16.	Zinc (as An) (mg/l)	5.0	15.0
17.	Phenolic compounds (as Phenol) (mg/l)	0.001	0.002
18.	Anionic detergents (mg/l) as (MBAS)	0.2	1.0
19.	Mineral Oil (mg/l)	0.01	0.3
	TOXIC MATERIALS		
20.	***Arsenic (as As) (mg/l)***	0.05	0.05
21.	***Cadmium (as Cd) (mg/l)***	0.01	0.01
22.	***Chromium (as hexavalent Cr) (mg/l)***	0.05	0.05
23.	***Cyanides (as CN) (mg/l)***	0.05	0.05

Sno.	Characteristics	Acceptable*	Cause for Rejection**
24.	*Lead (as Pb) (mg/l)*	0.1	0.1
25.	*Selenium (as Se) (mg/l)*	0.01	0.01
26.	*Mercury (total as Hg) (mg/l)*	0.001	0.001
27.	*Polynuclear aromatic hydrocarbons (PAH) (µg/l)*	0.2	0.2
28.	*Gross Alpha activity*	3_p Ci/l	3_p Ci/l
29.	*Gross Beta activity PCi ≈ pico curie*	30_p Ci/l	30_p Ci/l

Notes.

*The figures indicated under column 'Acceptable' are the limits up to which water is generally acceptable to the consumers.

**Figures in excess of those mentioned under 'Acceptable render the water not acceptable, but still may be tolerated in the absence of alternative and better source but up to the limits indicated under column "Cause for Rejection" above which the supply will have to be rejected.

'It is possible that some mine and spring waters may exceed these radio activity limits and in such cases it is necessary to analyse the individual radionuclides in order to assess the acceptability or otherwise for public consumption.

Table 8.3 Guideline values for bacteriological quality laid down by MUD

Organism	Unit	Guideline value	Remarks
A. Piped Water Supplies			
A.1 Treated water entering the distribution system			
Faecal coliforms	No./100 ml	0	Turbidity <1 NTU
Coliform organisms	No./100 ml	0	For disinfection with chlorine, pH preferably 8.0, free chlorine residual 0.2-0.5 mg/litre following 30 minutes (minimum) contact
A.2 Untreated water entering the distribution system			
Faecal coliforms	No./100 ml	0	
Coliform organisms	No./100 ml	0	In 98% of samples examined throughout the year-in the case of large supplies when

			sufficient samples are examined
A. 3 Water in the distribution system			
	Faecal coliform	No./100 ml	0	
	Coliform organisms	No./100 ml	0	In 95% of samples examined throughout the year – in the case of large supplies when sufficient samples are examined
	Coliform organisms	No./100 ml	3	In an occasional sample but not in consecutive samples
B Unpiped water supplies			
	Faecal coliform	No./100 ml	0	
	Coliform organisms	No./100 ml	10	Should not occur repeatedly; if occurrence is frequent and if sanitary protection cannot be improved an alternative source must be found, if possible.
C. Emergency water supplies			
	Faecal coliform	No./100 ml	0	
	Coliform organisms	No./100 ml	0	Advise public to boil water in case of failure to meet guideline values

Source Guidelines for Drinking Water Quality. Vol.1, WHO Publication

Table 8.4 Drinking water quality standards as recommended by the WHO and BIS

Parameter	WHO standards	Indian Standards: 10 500(1991)*

	Class A: Maximum permissible limit	Class B: Maximum allowable limit	
Physical parameters			
Colour (hazen)	5.0	25.0	5.0
Turbidity (NTU)	5.0	25.0	5.0
PH	7.0-8.5	6.5-9.2	6.5-8.5
Temperature (°C)	-	-	-
Conductivity (mho/cm)	-	-	-
Total dissolved solids	-	-	-
Total suspended solids	-	-	-
Total solids	500.0	1500.0	500.0
Chemical parameters			
Total hardness	-	-	300.0
Calcium as calcium carbonate	-	500.0	75.0
Magnesium as calcium carbonate	-	650.0	30.0
Acidity	-	-	-
Alkalinity as calcium carbonate	-	-	-
Bicarbonate as calcium carbonate	-	-	-
Hydroxide as calcium carbonate	-	-	-
Chlorides as chlorine	-	-	250.0
Total residual chlorine	-	-	-
Sulphates	200.0	400.0	200.0
Fluorides	0.5	1.0-1.5	1.0
Phenol	0.0	0.0	0.0
Manganese	0.1	0.5	0.1
Silica	-	-	-
Sodium	-	-	-
Potassium	-	-	-
Organic and nutrient parameters			
Dissolved oxygen	-	-	-
Biological oxygen demand	-	-	-
Chemical oxygen demand	-	-	-
Phosphates	-	-	-
Mercury	-	-	-
Oil and grease	-	-	-
Nitrates	-	50-100	45.0
Nitrites	-	-	-
Heavy metals	-		
Iron	0.3	1.0	0.3
Chromium	-	0.1	0.1
Boron	-	-	1.0
Zinc	-	-	5.0
Copper	1.0	1.5	1.5
Lead	-	0.1	0.1

*AMC is complying with these standards

Source

1. WHO. 1986. WHO Handbook. Geneva: World Health Organization.

2. ISI. 1991. Indian Standards (IS: 10 500). New Delhi: Indian Standards Institute.

Presently the AMC (Ahmedabad Municipal Corporation) is complying with IS-10 500 standards. In general, the Government of Gujarat or WRA (Water Regulatory Authority), as the case may be should consider redefining the scope of the parameters to be analysed and requisite standards to be adhered to. This can be done after taking into consideration the following:

- The quality of raw water source (both surface and ground). This should then be compared with the quality of water when the system was designed / commissioned and a brief analysis of the causes of change.
- The present local conditions like the source's vulnerability to pollution or poor efficiency levels of the treatment process or age of distribution network.
- Past track record related to water-borne diseases and related causal factors should also be taken into consideration.

However, the bacteriological parameters and residual chlorine concentration should be the bare minimum that the service provider shall always comply to with immediate effect. The scope of parameters under the quality criteria should at least be the same as that practised by the AMC at present.

However, all local bodies associated with water supply may not be in a position, either financially or technically, to meet with the identified standards. The regulator through an interactive and consultative process with the local bodies / service providers, should frame a time-bound action plan by which a uniform standard shall be applicable throughout the State. The action plan should include the short-term goals to be achieved and long-term objectives vis-à-vis water quality.

Surveillance systems

Water quality surveillance aims to reduce the risk of contaminated water to human health by way of a systematic and continuous monitoring of drinking water systems. A surveillance programme can ensure effectiveness only if supported by necessary legislation and regulatory standards. The scope of the surveillance programme is greatly influenced by the local conditions, technical and economic strength of the local municipalities. Surveillance programmes should not overlook the importance of co-ordination with health and sanitation departments. This would help in an inter-flow of information on water quality and health statistics in a transparent way so as to be able to draw correlations for future planning and disaster management.

The surveillance system to start with should be well defined including the scope of the parameters to be monitored and their frequency. This should initially be

comprehensive in nature so as to include aspects related to the nature of source, type of treatment process, distribution network and other local conditions. Modifications could be introduced at a later stage once trends and confidence levels are established with reference to:

- The operational efficiency of the treatment process,
- Health of the distribution system
- Interfaces of different service networks like water and sewage etc. and
- Correlation drawn between water quality and incidences of related diseases.

The quality of water undergoes changes during its travel from the source to the end user and this aspect needs to be carefully considered while deciding the sampling locations so as to get a sample fairly representative of the system efficiency. The possible locations for water quality monitoring could include:

- The source of raw water
- Different stages of the water treatment process to determine efficiency of different stages of treatment and identify areas requiring technical improvements / modifications
- Final treated quality
- Intermediate storage / pumping stations
- Locations where blending with ground water is being done
- Interfaces with other service networks like water and sewage etc.
- At other critical locations having chances / incidents of water contamination
- At the tail end nodes of the distribution network (since pressure, residual chlorine levels etc. are minimum at this location)

The number of water samples and location would also vary from season to season, being critical especially during rainy season.

The infrastructure facilities (in terms of manpower and laboratory requirements) and corresponding budgetary allocations for surveillance should be commensurate with the scope and parameters defined for sampling and frequency of analysis. As a guideline the MUD has stipulated minimum staff requirements for the water works laboratories (Table 8.5).

Table 8.5 Minimum staff requirement for water works laboratories

Staff	> 7.5 mld	Up to 7.5 mld
Water analyst (chemist)	1	-
Water analyst	1	-

(bacteriologist)		
Water analyst	-	1
Laboratory technician	3	-
Typist-cum clerk	1	-
Sampler Takers	3	1
Laboratory Cleaners	3	2

Source MUD (1991)

Similarly the minimum equipment requirements for physical, chemical and bacteriological tests have been defined by the MUD (Refer Annexure 8.1).

The framework for water quality surveillance, based on guidelines as stated above, should be formulated by the Government of Gujarat or WRA, as the case may be and the service provider should follow the same for the day to day surveillance. The regulator[45] should also consider setting up of an independent cell to monitor the performance of the service provider in this regard. This is proposed in view of the fact that there is no third party check in the existing set-up in many local bodies, such as the AMC leading to lack of accountability and transparency of operations. The system of checks and audit monitoring, as recommended by the European Commission Directive, for the service provider and the regulator respectively could be emulated as a model with suitable modifications (Table 8.6). The audit monitoring could be done through secondary surveys, sanitary inspections and limited primary monitoring using standard procedures. The agency for carrying out this third party audit monitoring should preferably be the regulator or else outsourced to organizations duly registered with the regulator.

Further, the service provider should take measures necessary to ensure that adequate and up to date information is available both to the regulator and consumer. In the event of the failure of the service provider to comply with the desired water quality, the consumers shall be informed promptly and given the necessary advice. The regulator and the service provider could take the remedial action jointly. The results of the check and audit monitoring and the follow up action (analysis and action) should be publicly available either on demand or disseminated through the electronic or print media. Further an effective system of redressal of complaints should also be in place.

The official journal of the European Commission Directive on the quality of water intended for human consumption specifies that samples must be taken at the point of compliance, within the supply zone or at the treatment works for particular parameters if it can be demonstrated that there would be no adverse change in the measured values of the parameters concerned. The minimum frequency of sampling and analysis as per its directive's guidelines is as Table 8.6.

[45] Here the regulator could be Government of Gujarat or WRA as the case may be.

Table 8.6 Minimum frequency of sampling and analysis as per European Commission Directive

Volume of water distributed/ produced each day within a supply zone (m^3)	Check monitoring* (Number of samples per year)	Audit monitoring** (Number of samples per year)
≤ 100	Frequency to be decided by the member State concerned	Frequency to be decided by the member State concerned
> 100 to ≤ 1000	4	1
>1000 to ≤ 10 000		1 + 1 for each 3300 m^3 /day and part thereof of the total volume
>10 000 to ≤ 1 00 000	4 + 3 for each 1000 m^3 /day and part thereof of the total volume	3 + 1 for each 10 000 m^3 /day and part thereof of the total volume
>1 00 000		10 + 1 for each 25 000 m^3 /day and part thereof of the total volume

Source EC Council Directive 98/83/EC of November 3, 1998
* Check monitoring - The purpose is to provide regular information on the organoleptic and microbiological quality of water supplied.
** Audit monitoring - The purpose is to provide the information necessary to determine whether or not all of the Directive's parametric values are being complied with.

The Directive also states that the minimum frequency for sampling could also be decided on the basis of the number of inhabitants in the supply zone assuming a water consumption of 200 lpcd. Further, the number of samples can be reduced if the results of the analysis over a period of at least two successive years remain compatibly unchanged, and are significantly better than the standards laid.

The WHO guidelines for drinking water quality recommend the following minimum sampling frequencies for drinking water in the distribution system.

Table 8.7 WHO guidelines for minimum sampling frequencies for drinking water

Population served	Samples to be taken monthly
Less than 5000	1 sample
5000-100000	1 sample per 5000 population
More than 100000	1 sample per 10000 population, plus 10 additional samples

Source Guidelines for drinking water quality Vol .1, World Health Organisation, 1995

The AMC is following the WHO sampling methodology as given above and in certain critical areas the number of samples are taken as one per 1000 population as against one per 10 000. Thus, overall, AMC is adequately following the national guidelines for water quality standards and WHO sampling methodology.

Conclusions

- The Government of Gujarat or WRA, as the case may be should formulate the minimum drinking water quality standards as per the BIS standards (Refer Table 8.3) and the framework for water quality surveillance for the service provider.
- The scope of water quality monitoring, number of parameters to be analysed and sampling and analysis methodology could be modified as per the WHO/ EC guidelines taking into consideration local conditions, raw water source and past track record.
- The Government of Gujarat or WRA, as the case may be should always ensure that the service provider meets the bacteriological quality and residual chlorine requirements, irrespective of the local conditions and the raw water source.

Annexure 8.1

Minimum equipment requirements for physical, chemical and bacteriological tests

- Comparator test set for residual chlorine or chloroscope
- pH kit with different discs for pH measurement
- Mains operated pH meter complete with one calomel electrode and one glass electrode
- Turbidimeter
- Dionic water tester or conductivity metre
- Photoelectric colorimeter
- Water bath with six to eight concentric holes and discs, electrically heated
- Soxhelt extraction unit
- Kjeldahl digestion unit
- Hot plates
- Distilled water plant
- Demineraliser
- Refrigerator
- B O D incubator
- Muffle furnace
- Electric oven
- ½ H P Motor
- Magnetic stirrer
- Analytical balance with weight box
- Jar-test apparatus
- Centrifuge
- Gas cylinder if gas supply is not available
- Fume cupboard

In addition to consumables like common glassware and accessories like a beaker, a conical flask, a burette, a pipette, a volumetric flask etc., following equipment is also needed for bacteriological examination:

- Hot air oven up to 200°C
- Autoclave or pressure cooker
- Incubator 37° C or 44° (water / air-jacketted)
- pH meter
- Pipette box (stainless steel)
- Wooden racks / aluminium racks
- Wire baskets

- Cotton / Aluminium foils
- Brown paper
- Twine
- Burners (Bunsen)
- Suction flask (1 litre cap)
- Suction Pump
- Sampling bottles (reagent bottles of 250 ml capacity)
- Bacteriological media - M. Endo Broth (dehydrated), Peptone / Triptone Water, Lactose or Lauryl Tryptose broth, Mac Conkey broth, Brilliant Green Bile Lactose Broth, and Total Plate Count Agar.

9 Legislative changes to remove impediments and to facilitate the regulatory framework

In this chapter we discuss the existing legislation governing the water sector in Gujarat, and examine the extent of modifications required to enable the functioning of the regulatory framework as outlined in chapter 6. The legislation examined in this chapter are:

- The Gujarat Infrastructure Development (GID) Act, 1999
- The Bombay Provincial Municipal Corporations (BPMC) Act 1949
- The Gujarat Municipalities Act (GMA) 1963
- The Gujarat Act No. 18 of 1979
- The Gujarat Panchayat Act 1993

Recommendation 1

There should be a Water Regulatory Authority which should maintain an arms-length relationship with stakeholders including government as well as local bodies, to regulate segments of water supply.

In order to give effect to the above recommendation, there is a need to enact a new legislation. In Chapter 6, we have argued as to why there is a need for independent legislation. The aim of the legislation could be to facilitate participation of private sector entrepreneurs in the water industry, and to take measures conducive to the development and management of the water industry in the state in an efficient, economic, and competitive manner, and to protect consumer interests including the constitution of a Water Regulatory Authority for the State of Gujarat.

Since the Gujarat Act No. 18 of 1979 established the GWSSB with the objectives of 'rapid development and proper regulation of water supply and sewerage services in the State of Gujarat', the regulation function of the GWSSB should be amended and be assigned to the proposed water regulator the WRA (Water Regulatory Authority). These are discussed subsequently in this chapter.

Recommendation 3

The WRA should have jurisdiction over the state of Gujarat, and should regulate the following segments of water supply system:

- Capturing the sources
- Treatment of water
- Transmission (also called 'conveyance') of water
- Distribution of water

The subsequent paras will take into account this recommendation while suggesting changes in the existing legislation.

Recommendation 4

It has been recommended that at present, the regulator should only frame guidelines for tariff determination. However, in the long run, it is recommended that the regulator should regulate the tariff for bulk water. The regulator should regulate the tariff for retail water in areas to be specified by the government from time to time. In areas not specified by the government, the regulator should frame principles for determination of tariff for retail water, and monitor the same. In other words, the regulatory process can be divided into two distinct phases.

In **Phase I**, the regulator would only set guidelines for tariff determination. The principles would be taken into account by the State Government while framing the tariff policy in the sector. During this period of regulatory reform, the existing practice of the government for giving effect to any tariff principles would be applied in this case.

In **Phase II**, the following amendments are suggested to facilitate the regulation of tariff by the WRA.

Gujarat Act No.18 of 1979

Section 14 (d) enjoins upon the GWSSB to review and provide advice on the tariff, taxes, fees and charges of water supply and sewerage systems in its areas of operation and also in the local bodies, which have entered into agreement with the Board. Following this mandate, the Board has been given the power to approve tariffs for water supply and sewerage services in these areas, and also to lay down the schedule of fees and other charges for all kinds of services rendered by the Board to the government, local bodies, institutions or individuals in these areas (Section 15 [2] [e] and [f]).

Section 43 stipulates that the Board should fix the cost of water to be supplied according to value and also the minimum cost to be charged in respect of each connection. Further, it may, in lieu of charging the cost of water according to value, accept a fixed sum for a specified period on the basis of expected consumption of water during that period for every consumer. Section 45 deals with the procedure and the manner in which the meter rate and fees for services such as connection, disconnection, reconnection, testing, supervision, etc., could be carried out by the board for the purpose of its services. Section 31(2) empowers the local body to levy such rates for water supply as suggested by the GWSSB. Section 63 lays down the provision for general penalty for failure of compliance with the order of the Board.

Since the WRA will be regulating the charges for bulk water supply as well as for retail water, the Board's function for fixing tariffs and other charges and the manner of such determination should be subject to intervention by the WRA. Therefore, its function under Section 14 (d) in respect of water supply has to be amended. Its power under Section 15(2) (e) and 15(2) (h) in respect of water supply has to be subject to regulations by the WRA. Section 43 would need amendment. Section 31(2) should be amended as the WRA would determine such rates or set the principles for such determination.

In effect, the powers / functions of GWSSB should be subject to WRA's power of regulation of water charges. The Section 14, 15, 31, 43, 45 should be modified accordingly.

Gujarat Municipalities Act 1963

Chapter VIII under the Act deals with municipal taxation. Under Section 99 (1) (ix), a municipality, subject to a general or special order of the State Government, can impose a general water rate or special water rate or both for water supplied by it in its areas. The process for fixing such a rate has been specified under Section 101. The municipality, by a resolution passed in a general meeting, can approve rules prescribing such rates. Under Section 102, a State Government has the power to sanction the said rules with or without modifications. Section 104 mandates the government to empower municipalities to levy tax or increase or decrease the tax levied under Section 99(1) (ix) within such variation as prescribed. Section 119 allows the municipality to fix water rates in lieu of taxes according to the consumption of water.

In Gujarat, the municipalities are in charge of distribution of retail supply of water directly, through GWSSB indirectly, or may engage another person such as a 'developer' to provide such supply. The municipality should be subject to the WRA's tariff regulation. Accordingly, these sections should be amended. Such regulation can be

of two forms: direct regulation or regulation through setting tariff principles and monitoring the same. Accordingly, Chapter VIII should be amended.

Bombay Provincial Municipal Corporations Act 1949

Chapter XI deals with municipal taxation. The relevant sections relating to water charges are Sections 129, 130, 134, 135, 136, 138, 141b, and 141e.
Sections 134, 135, and 136 would require amendment so as to incorporate the stipulation that tariff for retail supply of water should be subject to the tariff regulation by the Water Regulatory Authority. The power of the corporations to determine water tax under Sections 129, 130, 138 should be subject to tariff regulation of the WRA. Other sections such as 134, 135, 136, 141b, and 141e have to be amended accordingly.

Gujarat Panchayat Act 1993

Part II of the Act under Section 200(1)(13) deals with charges relating to water supplies through pipes. Panchayats can levy charges in any form to cover the cost of supply of water. The charges for water could also include the cost of supply of water. Schedule I to the Act says that whenever there is inadequate water supply or water supply which is unsafe for health, the village panchayat can arrange for additional supply at reasonable costs. These sections should be amended so that this process is subject to the WRA's indirect regulation.

Metering issues

In Chapter 7, we have seen that most of the retail consumers in Gujarat's water sector are not metered and are charged on the basis of rateable value of property or a flat rate. Such tariff structure is inherently inefficient and leads to distortions at two levels. One, it does not recover the cost of supply from a substantial number of consumers and two, it leads to waste and hence deprives other consumers of even their minimum needs.

It has also been suggested that development of a metering plan should be taken up as a priority measure. The regulator would also require the utilities, under direct as well as indirect regulation, to prepare a detailed metering plan and update the regulator on the same at regular basis.

In view of the above, Chapter VIII of the Gujarat Municipalities Act 1963, Chapter XI of the Bombay Municipal Corporations Act 1949, Part II (Section 200) and Schedule I of the Gujarat Panchayat Act 1993, and Chapter VIII of the Gujarat Act 18 of 1979, should be amended suitably so that these authorities should have plans for progressive metering the water services in their areas.

Recommendation 5

The WRA should recommend generic terms and conditions of the new concession[46] agreement in the water sector. The WRA should monitor the terms and conditions of the concession agreement.

Gujarat Infrastructure Development Act 1999

The GID Act 1999 (Sections 3 and 4) permits participation of the private sector in the water and sanitation sector in Gujarat. GID Rules 2000 (read with Section 5 of the GID Act 1999) stipulate that a concession agreement along with the proposal, worth Rs. 50 crore or more, should be forwarded to the GIDB, which may either recommend with or without modifications or not recommend, or return the proposal and the concession agreement for reconsideration of the state government, the government agencies, etc. The GID Rules 2000, further proposed to constitute a committee on contract finalisation with one of the committee members being a regulator with a non-voting right.

Since the Water Regulatory Authority would be a regulatory body kept at an arms-length from the government, it is desirable that the above committee on the contract finalisation should exclude the regulator being a member of the committee. Instead, the GIDB should invariably consider recommendations of the WRA on the generic terms and conditions of the concession agreement (worth the prescribed limit of Rs 50 crores and above), before the recommendations are finalised by it and forwarded to the government or other agencies (as envisaged under the GID Act, 1999). It is suggested that the GID Rules 2000 should be amended and should incorporate a provision for taking into consideration such recommendations of the WRA.

Bombay Provincial Muncipal Corporations Act 1949

Section 189(2) (c) of the BPMC Act, 1949 stipulates that the city corporation, for the purposes of supplying sufficient and proper water to its consumers, may enter into an arrangement for the supply of water. The provision does not envisage the obligation on the part of the corporation to seek the recommendation of the GIDB or WRA before it enters into an arrangement (for example under the concession agreement) for supply of water in the city.

It is suggested that Section 189(2) (c) of the BPMC Act 1949 should add that 'such arrangement by which the corporation enters into concessional agreement (beyond a

[46] 'Concession agreement' means a contract of the nature specified in schedule II of the GIDB Act 1999 (which includes water storage, water supply and sewerage system) between a developer and the State Government, a Government Agency or a specified Government Agency. Government agency includes local bodies

prescribed value as determined by the Government) with any developer[47] should be subject to Rules prescribed by the Government'.

Even for concession contract below Rs 500 million, the city corporations should consider the recommendations of the WRA on the terms and conditions of the concession agreement. Accordingly, the above section should incorporate a provision in this regard.

Gujarat Municipalities Act 1963

A similar provision should be incorporated under Section 65 of the Gujarat Municipalities Act 1963.

Section 15(2) (f) of the Gujarat Act No. 18 of 1979 should be amended to incorporate the above provisions, as suggested in the case of city corporations.

Recommendation 6

The WRA should recommend terms and conditions of a specific concession agreement if required by the government.

Since it would not be compulsory on the part of the government as well as local authorities to seek recommendation from the WRA, on the terms and conditions of the concession agreement (worth beyond a prescribed limit), there is no need to amend the existing legislation to enable the WRA for carrying out the above activities.

Recommendation 7

The WRA should monitor terms and conditions of the new concession agreement between the developer and local bodies in the water sector.

Gujarat Infrastructure Development Act 1999

Section 38 (f) of the GID Act 1999 extends the functions of the GIDB to coordinate and monitor the projects undertaken under the concession agreement in the state. Thus, a concession contract between a local body and a developer would be subject to monitoring by the Board as stipulated under the Act.

The local bodies would also monitor the implementation of the concession agreement. The monitoring by the GIDB is in addition to such oversight. Regulatory oversight by the WRA in monitoring the terms and conditions of the contract (whose value exceeds a prescribed limit) could be incorporated in the concession agreement. Therefore, there may not be any need to amend the existing provision of the current Acts

[47] A developer, as defined under the GID Act, 1999 means a person with whom concession agreement is entered into by the State Government, a Government agency or a specified Government Agency.

governing local bodies. Similar is the case with GWSSB for undertaking any such concession contract with any developer (Section 15 (2) (f)), which can always incorporate such monitoring power of WRA.

Recommendation 8

There should be a minimum standard for water quality to be provided by various service providers to their consumers. Either the Water Regulatory Authority or the Government of Gujarat should lay down and enforce minimum standards. It should also monitor the above standards through survey.

Gujarat Act No. 18 of 1979

Section 14 (f) enjoins upon the GWSSB to establish State standards for water supply. There is need to amend this section to give effect to the above recommendations. Section 15(2) (i) may also be amended to incorporate the fact that the Board should follow the standards set by the WRA / Government of Gujarat.

Gujarat Municipalities Act 1963

Chapter VI relating to functions of municipalities should incorporate a provision after Section 90 to the effect that the municipalities should follow the standards set by the WRA or Government of Gujarat.

Bombay Provincial Municipal Corporations Act 1949

Chapter XIII (Section 189) relating to water supply enjoins upon the corporations to supply the water 'proper and sufficient' for public and private purposes. This should be amended in order to incorporate the provision that the corporation should follow standards set by the WRA or Government of Gujarat.

Gujarat Panchayat Act 1993

Schedule I to the Act says that whenever there is inadequate water supply or water supply which is unsafe for health, the village panchayat can arrange for additional supply at reasonable costs. This should be amended in order to incorporate the provision that the village panchayat should follow standards set by the WRA or Government of Gujarat. Similar provisions would be made applicable taluka and district panchayats as well.

Recommendation 9

The WRA should lay down and enforce minimum standards of service to consumers. It should also monitor such standards through survey.

Gujarat Act No. 18 of 1979

Section 14 (f) enjoins upon the GWSSB to establish State standards for water supply. There is need to amend this section to give effect to the above recommendation. Section 15 (2) (i) may also be amended to incorporate the fact that the Board should follow standards of services set by the WRA. Section 52 which mandates the Board to cut off the water supply should be subject to regulation of WRA, and should be amended accordingly.

Gujarat Municipalities Act 1963

Chapter VI relating to functions of municipalities should incorporate a provision after Section 90 to incorporate the fact that the municipalities should follow the standards set by the WRA.

Bombay Provincial Municipal Corporations Act 1949

Chapter XIII (Section 189) relating to water supply should incorporate a provision that the corporation should follow standards set by the WRA.

Gujarat Panchayat Act 1993

Schedule I to the Act relating to water supply should incorporate a provision that the corporation should follow standards set by the WRA or Government of Gujarat.

Recommendation 10

The WRA should promote economy and efficiency in water supply services in Gujarat.

Section 35 of the Gujarat Act 18 of 1979 says 'the Board shall not, as far as practicable, and after taking credit for any grant or subvention from the State Government under section 36 carry on its operations under this Act at a loss'. For being efficient in its working, the GWSSB should be financially viable, and it should earn a minimum rate of return as fixed by WRA. This Section should be amended accordingly.

Recommendation 11

The WRA should facilitate competition in water sector in Gujarat.

No need to amend the existing legislation for giving effect to the above recommendation. The new legislation, which would constitute the WRA, should assign this function to the authority.

Recommendation 12

The WRA should adjudicate upon disputes and differences amongst various service provides and / or between a service provider and a group of consumers on quality of water services. Section 31(3) of the Gujarat Act No. 18 of 1979 relates to settlement of disputes between the GWSSB and the municipality subject to decisions of government. Section 31(3) of this Act should be amended accordingly to assign this function to the WRA.

Recommendation13

The WRA should aid and advise the government for developing a Water Use Policy for Gujarat. The government should call for an annual report on the water use in the state from the WRA. The WRA should monitor such annual water use on the part of the local bodies.

The Gujarat Municipalities Act 1963 (Chapter VI), and the Bombay Provincial Municipal Corporations Act 1949 (Chapter VI), should incorporate the fact that annual water use by the local bodies would be monitored by the WRA. Section 15(2) (e) of the Gujarat Act No. 18 of 1979 should be subject to annual water use policy in Gujarat. Chapter VIII (Section 49) of the Gujarat Act 18 of 1979 should be amended accordingly.

Recommendation 14, and 15

The regulator should coordinate with other regulators such as Gujarat State Pollution Control Board for framing and evolving guidelines for sustainable water use in the State.

The WRA should perform such functions as are assigned to it by the Government of Gujarat at a later date.

No need to amend the existing legislation for giving effect to the above recommendation. The new legislation, which would constitute the WRA, should assign this function to the authority.

Recommendation 16

1. The WRA should consist of three members. The Chairman and Members of WRA should be selected through a Search Committee. The Search Committee should be consist of the following members.

- Chairman of the Gujarat Public Service Commission, should be the Chairman of the Selection Committee.
- Secretary incharge of the Urban Development.
- Senior most Secretary in the Department of Narmada, Water Supply, and Water Resources, the Convenor of the Committee.

The qualifications of the Chairman / Members should include:

- The Chairman should have special knowledge and professional experience in the field of administration, economics, commerce, law or management, consumer affairs, and should be a person who is or has been an Additional Chief Secretary to the Government of Gujarat or has held an equivalent post in the government.
- One member should have qualification and experience in the field of engineering with specialization in water supply, water resource management and planning, and should be a person who is or has been a Chief Engineer to the Government of Gujarat or has held an equivalent post in the government.
- One member should have qualification and experience of not less than 15 years in the field of finance with a special reference to investment and cost analysis in the government or in any financial institution or industrial or services sector.

2. The tenure of the members of the WRA should be five years. The Chairman and the members should be appointed on a staggered basis with the maximum age limit being 65 years. The reappointment of members should be allowed. Disqualification criteria should include prohibition of interests in regulated entities in addition to the following:

- Member of Parliament or of any State Legislature or any local authority, or political parties.
- Insolvency, unsound mind, conviction of any offence etc.

3. The members of the authority cannot be removed without a cause. Any member of the WRA shall only be removed from his office by order of the Governor on the ground of proved misbehaviour after an enquiry by the High Court on a reference by the government. The Governor may suspend any Member of the authority with respect to whom a reference has been made to the High Court until the Governor has passed orders on the receipt of the report of the High Court on such reference.

4. The members of the authority should not appear before the authority as a representative of any person for a period of three years of his completion of tenure, and should not acquire any interests in the regulated entities.

5. The authority shall have its own fund and all receipts of the authority, including grants from the State Government, should be carried thereto and all payments by the authority shall be made therefrom. The authority should prepare its own budget.

6. The authority should be able to hire expertise independent of government's control.

7. The WRA should be advised by an advisory committee. The composition of the advisory committee should be determined by the WRA, and it should include interests of local bodies in addition to representing interests of industry, agriculture, labour, consumers, non-governmental organizations, academic, research bodies in the water sector. The functions of the advisory committee shall be to advise the WRA on major questions of policy, on matters relating to quality of service, matters relating to protection of consumer interests and overall standards of performance of public service providers.

No need to amend the existing legislation for giving effect to the above recommendation. The new legislation, which would constitute the WRA, should assign this function to the authority.

Recommendation 17

The following are recommended.

- The WRA should ensure transparency during the regulatory process.
- The WRA should hold judicial proceedings while discharging its dispute settlement function.
- An appeal against the decision of the WRA must be to an independent body and should be on a question of law. The appellate authority could be the High Court or a Tribunal in Gujarat with quasi-judicial powers.
- The authority should maintain proper accounts, prepare an annual statement of accounts in such form as may be prescribed in consultation with the Comptroller and Auditor-General of India.
- It accounts should be audited by the Comptroller and Auditor General of India.
- Its accounts certified by the Comptroller and Auditor-General, shall be forwarded annually to the State government by the Authority and the State government shall cause the audit report to be laid, as soon as may be after it is received, before the State Legislature.
- The authority shall prepare once every year in such form and at such time as may be prescribed, an annual report including a summary of its activities during the previous year and copies of the report shall be forwarded to the State government. A copy of such report should be laid before the State Legislature.

No need to amend the existing legislation for giving effect to the above recommendation. The new legislation, which would constitute the WRA, should assign this function to the authority.

Recommendation 18

The WRA should have adequate power to ensure compliance of its order and 'directions'. If these are violated, there should be adequate punishment.

If an offence is committed by a company, then the person in charge for the conduct of the company would be liable.

The authority shall for the purposes of any inquiry have the powers of a Civil Court while trying a suit, in respect of the following matters: a) summoning and enforcing the attendance of any witness and examining him on oath, b) requiring the discovery and production of any document or other material object producible as evidence, c) receiving of evidence on affidavits, d) requisitioning of any public record or a copy thereof from any court or office, e) issuing commissions for examination of witnesses or documents, f) reviewing of its decisions, directions and orders.

The provisions of the Code of Criminal Procedure, 1973 relating to search shall apply. The authority may call upon the specified government company or any person to furnish to the authority periodically, or, as and when required, any information concerning its or his / her activities related to water supply. The WRA should have full powers under Section 195 of the Criminal Procedure Code to prosecute contempt in case of contempt shown for lawful authority of public servants, etc.

The WRA should have full powers under Chapter XXVI of CrPc in regard to offences affecting the administration of justice.

Section 78 of the Gujarat Act 1979 empowers the GWSSB to make bye-laws relating to water supply, water charges, etc. These should be subject to regulation by WRA. This section should be amended accordingly.

Recommendation 19, 20, and 21

The other elements of the regulatory framework are recommended as follows:

1. The authority should be subject to the policy direction of the government. The policy direction should be consultative, reasoned and transparent. In case of dispute, government's decision is final

2. The state government should have the following powers over:

- the salary, allowances and other conditions of service of the Members.
- the form and the manner in which and the authority before whom the oath of office and secrecy.
- the form in which and the time at which, the WRA shall prepare its budget.
- the form in which the annual statement of accounts is to be prepared by the WRA.
- the form and the time within which the annual report shall be furnished.

- any other matter which is to be, or may be, prescribed, or in respect of which provision is to be made by rules.

3. The WRA should make regulations on the following matters.
- the salary, allowances and other conditions of service of the employees.
- terms and conditions of consultants.
- the manner in which the charges for water are determined .
- the manner in which the quality of service is determined
- any other matter which is to be specified for carrying out its activities.

No need to amend the existing legislation, as the proposed legislation should contain such provision.

Conclusion

It is recommended that a detailed scrutiny of the Acts/rules for carrying out such changes should be carried out whenever the legislation constituting the WRA is proposed. In addition, with the 73rd and the 74th Constitutional Amendments, the water supply function vests with the local bodies. Thus any legislative changes that are proposed should not violate the spirit of the 73rd and the 74th Constitutional Amendments.

A short note

The above analysis does not deal specially with the Gujarat Panchayat Act 1993 (except in the case of recommendations 3, 4, 5, 9 and 10), since similar modification, as applicable to municipalities would be applicable *mutatis-mutandis* in the case of Panchayat bodies as well. This type of modification would enable the extension of WRA to these bodies.

It is further noted that the changes of the existing Acts, (Annex 9.1) as suggested above, are indicative in nature. A detailed scrutiny of the Acts is required, whenever the proposed legislation constituting the WRA, is considered by the government.

The regulation function of the GWSSB in water supply activities has to be withdrawn once the WRA is constituted in Gujarat. These would also require additional changes, in Chapter X (penalties and procedures), Chapter XIII (Rules, Regulation and Bye-laws), Chapter VII and Chapter V, in addition to those stated earlier. It is suggested that chapter X should be amended to divest of the GWSSB's power to impose penalties as regards its regulating of activities in water supply.

Annex 9.1 Sections of the following Acts being affected in enabling the working of the proposed regulatory framework

Recommendations	GID Act 1999	BPMC Act 1949	GMA, 1963	Gujarat Act 18 of 1979
Recommendation 1	-	-	-	Regulation function of GWSSB in water sector be divested
Recommendation 2 and 3	-	-	-	-
Recommendation 4[48]	-	Chapter XI: 129, 130, 134, 135, 136, 138, 141B, 141E	Chapter VII: 99(i) (ix) till 104, 119	14 (d), 15(2)(e)&(f), 31(2), 43, 45
Recommendation 5	GID Rules, 2000	189 (2) (c)	65	15(2)(f)
Recommendation 6	-	-	-	-
Recommendation 7	-	-	-	-
Recommendation 8	-	Chapter XIII Section 189	Chapter VI, Section 90	14 (f), 15 (2) (i)
Recommendation 9	-	Chapter XIII Section 189	Chapter VI, Section 90	14 (f), 15 (2) (i), 52
Recommendation 10	-	-	-	-
Recommendation 11	-	-	-	35
Recommendation 12	-	-	-	31(3)
Recommendation 13	-	Chapter VI	Chapter VI	15(2) (e), 49
Recommendation, 14, 15, 16, 17	-	-	-	-
Recommendation 18	-	-	-	78
Recommendation 19, 20, 21	-	-	-	-

[48] In Phase II of the regulatory process, the WRA should also regulate water tariff as discussed in Chapter 6

Note. Recommendations 4, 5, & 6 of Chapter 6 in relation to the Gujarat Panchayat Act 1993 would affect Part II (Section 200) and Schedule I. Similarly, recommendations 10 and 11 of Chapter 6 would affect Schedule I of the Gujarat Panchayat Act 1993.

10 Water sector reforms: agenda for action

Regulatory reforms in the water sector in Gujarat, as discussed in the previous chapters alone would not be sufficient for bringing about a marked improvement of water services in Gujarat today. It is necessary to introduce substantial reforms in the sector. This would include developing a sector vision document, improvements in operational and maintenance practices, institutional restructuring, tariff reforms, and introducing private participation, apart from regulatory reforms in the sector.

Sector assessment

As highlighted in Chapter 2, the water sector in Gujarat, especially in many urban areas is characterised by a 'low level equilibrium'. The resultant outcome is the poor finances in the water sector. As a result, most water service providers in Gujarat are not financially viable, and have to depend heavily on government subsidies. In addition, the institutional and regulatory framework does not encourage efficient operation by service. This is compounded by the fact that there is also no incentive amongst various players to bring about changes in the existing unsustainable water management system. There is a need to create an environment, which will give emphasis on performance improvement, rather than the current focus on physical expansion of the water services.

In Gujarat, there is also a need for an appropriate policy for management and allocation of scarce water resources. Management of water resources should give a lot of stress on the demand side of the resources rather than the supply of existing resources. An integrated approach to water development, which would call for promotion of use of surface water and ground water is a needed. Existing institutions entrusted with allocation, planning, and management of water, should be geared up to evolve such an approach.

Principles for reform

Given the above background, significant restructuring at the institutional level in Gujarat's water sector is called for. The main guiding principles of these reforms are the following[49].

- Separation of regulatory functions from direct operations
- Service operations to be run on commercial principles with customer orientation
- State government to focus on facilitating reforms and not direct operations
- Role of local governments to focus on specifying and ensuring local service standards through appropriate service providers and ensuring access for the poor
- Enhanced role of customers and civil society associations in providing effective feedback to regulators
- Insulating sector from micro-management and competitive populism

Based on the above guidelines, a detailed sector reforms program would have to be developed. As mentioned earlier, this would include developing a sector vision document, improvements in operational and maintenance practices, institutional restructuring, tariff reforms, and introducing competition and private participation in the sector, apart from regulatory reforms. An appropriate study to devise a sector reforms strategy for water supply and sanitation services for the state of Gujarat based on a review of the current modes of delivery of the services in the state, the international experience in privatisation of water supply services, and the specific constraints faced by the state in this sector should be initiated on a time bound basis. The study should also provide a reform package for the evolution of the water supply and sanitation sectors in a market oriented economy.

[49] Adapted from the draft report of the Sukhatankar Committee, Government of Maharashtra (September 2000)

Regulatory framework for water services in the state of Gujarat

Volume II

Prepared for **Gujarat Infrastructure Development Board**

Gandhinagar

TERI Project Report No. 2000ER61

Volume II

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A Case study of the Ahmedabad Municipal Corporation

Ahmedabad, the former capital of Gujarat, is the largest city in the state with a population of about 3.3 million in 1991. It is situated on the banks of the river Sabarmati, about 80 km north of the Gulf of Cambay. The city is spread over an area of 192 square kilometres. The Sabarmati flows through the city from north to south dividing the city into eastern and western parts. A leading industrial city, Ahmedabad is the commercial capital of the state. The city is situated at 23 01' N and 70 37'E. It lies at an average altitude of 49 m above mean sea level and has a maximum level difference of about 4 m. The temperature varies between 47 °C and 4 °C. Relative humidity during the summer varies between 64% and 73%. The average annual rainfall in the city is about 750 mm, which occurs generally from June to September. Parts of the city get inundated when flash floods occur in the river. Mostly, the geology is made up of sandy soil.

Ahmedabad Urban Agglomeration had a decadal growth rate of about 30% between 1981 and 1991 (Figure A.1). About 85% of the total population lives within the municipal corporation limits.

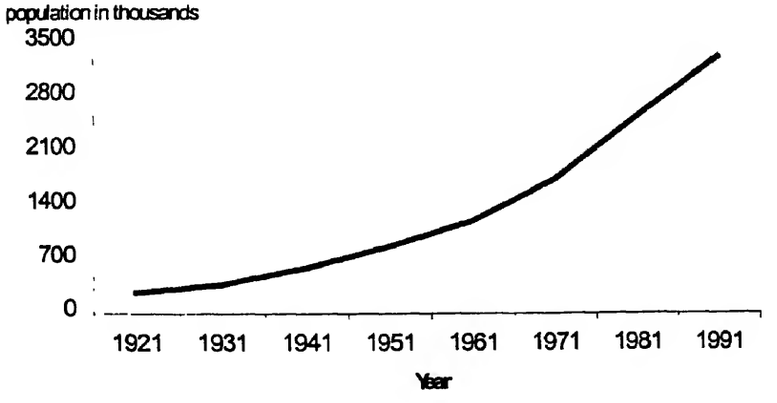

Figure A.1 Population growth in Ahmedabad Urban Agglomeration (thousands)

Source AMC (1999)

Institutional framework

The civic services in Ahmedabad city are provided by the AMC (Ahmedabad Municipal Corporation) which was established in July 1950 and is governed by the provisions under the BPMC Act (Bombay Provincial Municipal Corporations Act, 1949). The AMC is divided into 43 wards. In conformity with the BPMC Act, each ward elects three Corporators. Thus, there are 129 Municipal Corporators in the municipal board.

The municipal limits were revised in February 1986, and the total service area under the AMC increased from 98 square kilometres to 192 square kilometres. The western peripheral area of the Ahmedabad Urban Agglomeration (AUA) is developing at a rapid rate. This includes about 78 square kilometres of the Ahmedabad Urban Development Authority (AUDA). These areas are expected to be included in the AMC limits in the near future. The service area of AMC would then increase to about 269 square kilometres.

The city is divided into five administrative zones, namely north, south, east, west, and central zone. Table A.1 gives the population distribution of each zone. The central zone, which comprises most of the old city limit, is the most densely populated. The southern zone with the largest area and the lowest population, has a population density just 16% that of the central zone.

Table A.1 Population (thousands) and area (square kilometres) by zone

Zone	Area (km^2)	Population (thousands)
Central	16.50	595
West	42.32	575
North	32.19	624
East	27.51	608
South	72.32	475

Source AMC (1999)

Under Section 63(20) of the BPMC Act the AMC is responsible for providing water supply and sewerage services as part of its obligatory duty. Chapter VI of the amended BPMC Act outlines the obligatory and discretionary functions of the corporation. Under Section 63, it is the obligatory function of the corporation to make reasonable and adequate provision by any means or measures which it is lawfully competent for it to use or to take the management and maintenance of all municipal water works and the

construction or acquisition of new works for a sufficient supply of water for public and private purposes. This provision of water supply under the obligatory function of the municipal corporation existed even before the enactment of the 74th Constitutional Amendment (1993).

The corporation has three statutory committees: Standing Committee of the board, the Transport Committee, and the School Board Committee (AMC 1999). Water services, like other municipal services, are under the scrutiny of the Standing Committee established under the provisions of Chapter II Section 4(1). This committee appointed by the Municipal Board, has twelve members and meets on a weekly basis.

Other (non-statutory) committees are established by the corporation under Section 30(1). The committee which deals with the water sector is called the Water Supply and Sewerage Committee. Additionally, the Health Committee monitors the water quality in the city, and the Tax Committee deals with tariff related issues. However, the authority for determining all tariff-related issues, including water tariff and water charge, rests with the Standing Committee and the Municipal Board.

The chief executive officer of the corporation is the municipal commissioner, who is assisted by eight deputy municipal commissioners, each heading either one zone or areas covering administration activities, and engineering related projects. The engineering department in the corporation is responsible for executing all water supply projects in the city. There is an engineering department at the zonal level too. The other departments at the zonal level are for taxation, health, town development and estates, and administration, of which the first three are involved with the water services in the city.

Overview of water sector

The water supply and sourcing strategy in the AMC is to rely more on surface water so as to conserve groundwater resources. Towards this end, the AMC has constructed the Raska project on the Mahi river and has entered into negotiations with the state government for water from the Sardar Sarovar project. The objective is to minimize the reliance on groundwater resources and recharge these using the surface water from the Raska project and the Narmada river (Sardar Sarovar project).

Water sources

The AMC receives water from three primary sources: French wells and infiltration wells for abstracting surface water, and tubewells for drawing groundwater. During 1997, it received about 486 MLD (million litres per day) from the sources. The break up of supply is indicated in Table A.2.

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Table A.2 Sources of water supply in the Ahmedabad Municipal Corporation

Source	Number	Supply (million)	Percentage of total supply
Surface water			
French wells	5	145	30
Infiltration wells	16	82	17
Groundwater			
Tubewells	327	259	53
Total		486	

Source TCE (1997)

The average water supply during 1990–2000 was about 424 MLD (Figure A.2), with the supply varying between 448 MLD in 1999 and 406 in 1998. The supply has been estimated at 416 MLD in 1999/2000.

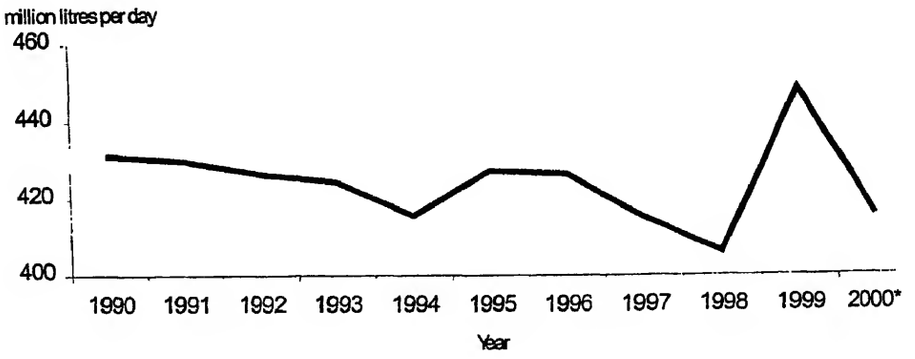


Figure A.2 Water supply in the Ahmedabad Municipal Corporation (million litres per day)
Source AMC (1999)
*estimated

Groundwater

About 53% of the water supply in 1997 was drawn from groundwater sources (Table A.3). Due to the drought conditions in Gujarat and the consequent unavailability of surface water from the rivers in 1999, it rose to 62%. Additionally, Most of the industries meet their water demand through their privately owned tubewells.

Of the 327 tubewells owned by the AMC, about 200 situated in the old municipal limits (that is, limits prior to February 1986) are about 260 metres deep whereas the rest

of the tubewells situated in the newly merged area (that is, East Ahmedabad) are about 183 metres deep. Water is drawn from these tubewells through submersible pumps that are fitted at depths of 90–122 metres depending upon the level of water in the tubewell. Normally, 1.5 MLD water is drawn from each 260-metres-deep tubewell per day and 0.75 MLD from each 183-feet-deep tubewell. To maintain the supply of water the corporation keeps constructing new tubewells to replace tubewells (the normal life of a tubewell is about 15 years) that become defunct.

As can be seen from the Table A.2, supply of water from the French wells and infiltration wells is not sufficient to meet water demand, estimated to be about 1000 MLD in 2001 within the present corporation limits (TCE 1997). Hence, the AMC would have to depend heavily on subsoil water drawn from tubewells. On account of excessive drawing of water from tubewells, and the large number of private tubewells being constructed in and around the city, the water table in the city has been decreasing at an average rate of 3–4.5 metres every year. This makes 10–12 tubewells defunct every year. In 1999/2000 the water table presently was over 350 feet deep. The groundwater depth in Ahmedabad over the last 40 years is given in Table A.3 and if sufficient surface water is not made available further depletion of groundwater level is imminent in the coming years.

Table A.3 Groundwater depth (metres)

Year	Ground water (feet)
1960	17
1965	40
1978	67
1980	78
1990	94
1995	100
1998	108

The depletion of water level in the tubewells is a cause for concern, as the water quality may deteriorate due to the increased TDS (total dissolved solids), chlorine, and fluoride in the water. Besides, the corporation has to lower pumps in the tubewells from time to time due to the fall in the groundwater table, and incur higher expenses on energy consumption.

Interestingly, there is no provision for regulating the extraction of water from tubewells. However, Chapter XIV of the Schedule A (defining the rules, by-laws, regulations, and standing orders of the BPMC Act) Section 16 requires that the

municipal commissioner's sanction be taken before any new well, pond, cistern, or fountain is dug or constructed. The *Oxford English Dictionary* (1996) defines a well *as* a lined shaft sunk in the earth whence a supply of water, oil, etc is obtained. Thus the definition of well would include tubewells, and groundwater extraction can be regulated in the city under this provision of the BPMC Act.

Surface water

Surface water accounted for nearly 47% of the total water supply in 1997. During 1999, the supply reportedly fell below 32% of the total water supply. Until recently, the city depended entirely on the Dharoi dam constructed 153 km upstream of Ahmedabad for sourcing water. The municipal corporation's share in the cost of construction of the dam is 52.1%, with the rest of the investment coming in from the state government.

The water discharged into river travels through open channels and, on reaching Ahmedabad, is ponded around the French wells and infiltration wells. The ponded water is then filtered through the natural process of sand-bed filtration, and is drawn through these wells.[50] These wells are interconnected to supply water to the Dudheshwar Water Works, one of the two water treatment plants in the city.

The city has five French wells located in the Sabarmati river bed at Kotarpur, Bhadreshwar, Camp Acher, railway bridge, and Sabarmati. Except for the Camp Archer French well, which is 23 years old, the remaining 4 French wells were constructed during 1986 and 1987 as an interim arrangement till the AMC found a dependable water supply source for the city.

The 16 functional infiltration wells in the riverbed of Sabarmati are more than 50 years old. In all, there are 25 infiltration wells in the river. Frequently, these wells go out of order and need repairs. During the monsoons, these wells are often non-functional due to floods.

As per the understanding of the AMC with the state government, the corporation was to get 680 MLD water from the Dahrohi dam reservoir by discharge of adequate raw water from the dam into open channel of the river. It was assumed that the transmission loss would hardly be 10%–15%, ensuring the AMC got about 600 MLD. However, by the time the water from the dam reaches Ahmedabad, about 66% of the water is lost in transit on account of evaporation, infiltration, and tapping by the farmers, Gandhinagar city, Gujarat Electricity Board, and Ahmedabad Electricity Company.

[50] Infiltration wells are shallow wells in the riverbed, about 6 deep.

Raska project

Due to the failure of the monsoons in 1999, and the low level of supply from the Dharohi dam, the Raska project was conceived of on the river Mahi. The cost of the project was 1.1 billion rupees and the project was executed within five months. The project involved the laying of a 32 km long pipeline from the main canal on river Mahi to Ahmedabad. About 300 MLD is made available from the Raska project. The water is treated at the Kotarpur Water Works, which has a capacity 600 MLD.

Narmada-canal-linked water project

To meet its demand for additional water, the AMC is exploring the possibility of drawing water from the Sardar Sarovar project based Narmada canal. In Gujarat the Sardar Sarovar project involves a terminal dam called the Sardar Sarovar dam on the Narmada river with a 460 km long main canal. This canal is called NMC (Narmada Main Canal). Numerous branches have been planned from the NMC that will cover Saurashtra and other regions towards the Arabian Sea and the Gulf of Cambay. The NMC passes about 3 km upstream of Kotarpur. About 980 mld from Narmada is required. However, it is expected that the water supply from the Narmada canal would be only about 132 MLD.

The corporation has decided to undertake water projects to tap 980 mld from the Narmada canal in stages to meet the total requirements of the city till the year 2021, without depending on from the Dharoi and tubewells. The corporation is considering the possibility of exchanging the Dharoi water to the state government for an equal quantity of water from the canal so that the former could be utilized in the critical areas of Mehsana district. Thus, the AMC could get 610 to 855 mld of water from the Narmada canal in exchange for Dharoi water. The rest of the water, can be bought from the Sardar Sarovar Narmada Nigam Limited. A decision in this regard has to be taken.

Water treatment system

As mentioned earlier, Ahmedabad has two water treatment plants: one at Dudheshwar and the other at Kotarpur. The Dudheshwar Water Works which was constructed in 1891 and treats water from the infiltration wells network located in the Sabarmati river bed, supplies 82 MLD to the city distribution network.

The Kotarpur Water Works was commissioned in 1976 at an estimated cost of 540 million rupees for treating 680 MLD water that was expected from the Dharohi dam. It was envisaged that on completion of the Kotarpur project, and on the availability of 680 MLD of raw water from the Dharoi dam, the AMC would be in a position to supply water round the clock. This would also enable it to stop drawing water from borewells, and hence conserve underground sources of water and save on energy costs. The

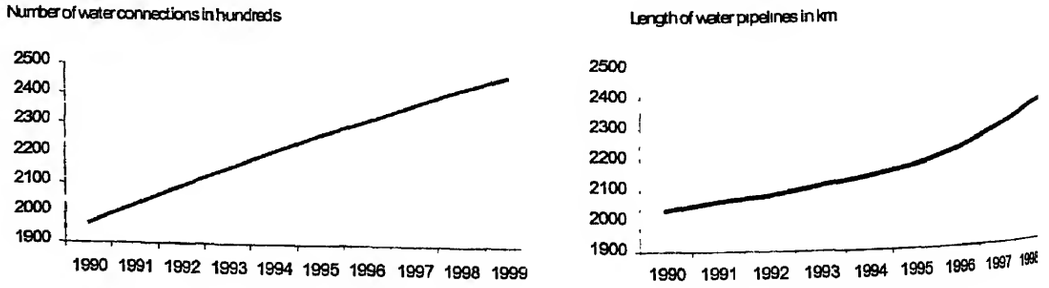
treatment capacity of this plant is 600 MLD. The work was to have been completed by 1978. Due to unsatisfactory water supply from the Dharoi dam, the work on the project was delayed, and it was decided to continue using the French wells. As stated earlier, the availability of water at Kotarpur falls short of the capacity of this plant. Moreover, water from the Dharohi dam is presently flowing into the river toward Dudheswar Water Works and being drawn and utilized through the French wells and infiltration wells by the natural process of the sand-bed filtration. Therefore, this water is not available for diversion to the Kotarpur water project. Thus, the execution of the project was delayed and it was completed only in 1997/98.

The commissioning of the Kotarpur Water Treatment Plant requires a minimum of 600 MLD of water at Kotarpur to run all the three streams of the plant with a minimum of 200 MLD of water for running each stream of the plant. After the execution of the Raska Water Project, 300 MLD of water has been made available to the Kotarpur Water Works. Thus one stream at the plant is fully operational while another stream is currently being utilized 50% of the time.

Distribution system

The distribution system consists of a network of cast iron pipelines having a total length of about 2175 km. The treated water from Kotarpur Water Works is fed to the distribution system in the central, west, and north zones of the AMC. While the central zone is almost completely dependent on surface water, the other zones rely primarily on groundwater. Water supply in the city for two and a half to three hours during a day, from 6 a.m. to 8 a.m., and an hours or so in the afternoon. When there is a shortage of water on account of failure of rains or depletion of flow of water in the Sabarmati, the water supply in the afternoon is curtailed. The average supply in the city is about 152 LPCD (litres per capita per day).

There are about 246 239 service connections (1999) but the water supply in the city is largely unmetered, except for the bulk consumers. The total number of connections is expected to grow to 281 000 by 2001. However, only four percent of these are anticipated to be metered. The supply is largely for domestic use, and the water supply for commercial purposes is marginal. The industries and major bulk consumers have their own private tubewells. Figure A.3 shows growth in the water distribution network.



Source AMC (1999)

There are no estimates of the extent of losses and leakages in the water distribution system in the city. It is expected that over 20% of water is wasted on account of leakages in the water supply lines, mainly in the distribution network. The AMC has undertaken a leak detection programme for a period of three years, and plugging of the leakages has been identified as a priority area.

Water demand

The demand for water in the AMC limits is estimated to grow to about 1000 MLD in 2001 by TCE (1997). However, the *Gujarat Infrastructure Agenda: Vision 2010* document of the GIDB (Gujarat Infrastructure Development Board) estimates this demand at 715 MLD (Table A.4).[51]

Table A.4 Water demand projections for Ahmedabad

Year	*Population* (millions)	*Demand* (MLD)[a]	*Incremental demand* (MLD)	*Gap* (MLD)	*Cumulative investment* (rupees million)
2001	4.4	715.44	61.60	252.44	1994.2
2004	4.9	782.84	67.40	319.84	2526.7
2007	5.3	856.59	73.75	393.59	3109.3
2010	5.9	937.28	80.70	474.28	3746.8

Source GIDB (1999)

[a] million litres per day

Currently, the AMC supplies water largely for domestic purposes (about 85% of the total water supply). Major industrial demand is not met by the AMC. Only about 5800 commercial, light industrial and service users are given municipal supplies and these are all metered. There is no metering policy in the AMC for residential connections. Only 1385 domestic connections are metered (Figure A.4). Additionally, the AMC has given about 1700 temporary metered connections to construction sites.

[51] This was estimated using a base year population of 3.3 million, and assuming a decadal growth rate of about 35% and water demand at 160 LPCD.

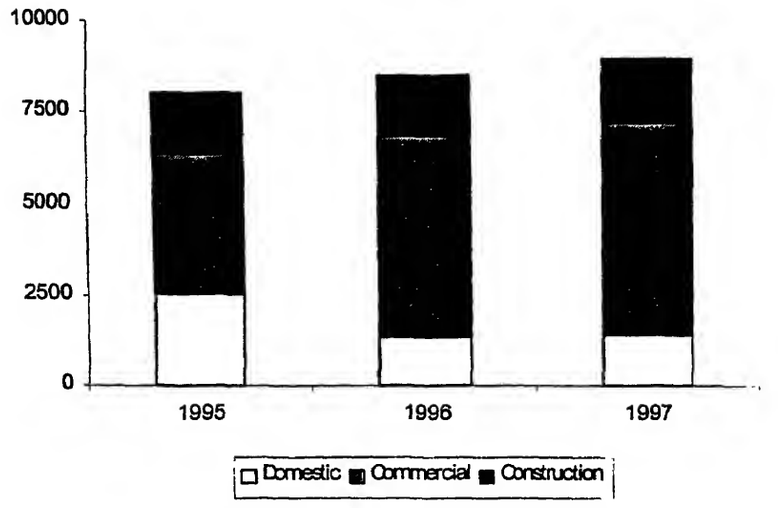


Figure A.4 Distribution of metered water supply connections in the Ahmedabad Municipal Corporation

Source AMC (1999)

Consumers not supplied by the AMC include textile mills, railways, power plant, etc. These consumers draw their requirements from their own tubewells. There are no plans for supplying water to large industrial consumers in the near future.

Water quality in Ahmedabad Muncipal Corporation

The AMC is committed to providing wholesome water to its residents. The corporation follows WHO (World Health Organization) guidelines or the BIS (Bureau of Indian Standards) which stipulate that for a city with a population of 3 million water should be sampled at the rate of one sample per 10 000 people per month which comes to 300 samples per month for Ahmedabad. The samples of the AMC are being drawn from source directly, within the distribution system, and at consumer end points. Two kinds of tests are performed, namely chemical and bacteriological tests. Given the fact that the quality of water is more likely to be poor in the old city and is thus more prone to water-borne diseases, one sample is taken per 1000 people. The agencies involved in testing are the central laboratory, water supply department, and the health department. Usually, about 6000 samples are tested monthly by these laboratories.

Water quality parameters in the French wells are reported to be within the desirable limits of drinking water standards. The results of the tubewell water indicate that chlorides and the TDS have exceeded their desirable limits, but are within the maximum permissible limits. In general, even though the water quality of all the tubewells is

within the permissible limits, further exploitation of groundwater resources should be avoided to prevent quality deterioration and depletion of water level.

The municipal commissioner has wide powers to ensure that the water quality is not adversely affected and that the health impacts due to any contamination are minimized. For instance, under Chapter XIV (Schedule A Section 34) of the BPMC Act, the Commissioner can prohibit the use of water from any source likely to cause or spread diseases. Similarly, Section 31 authorizes the commissioner to shut down any factory that is polluting any water source.

Quality of service standards

There are no statutory service quality standards that the corporation is required to follow. However, the AMC released a *Citizens Charter* in February 2000, which listed certain standards for some of the services provided by it (Table A.5). The AMC is one of the few municipal bodies in the country which have a document that provides a framework for evaluating municipal services. However, these standards only serve as guidelines. The *Citizens Charter* could be taken as a starting point for laying down standards of service in the municipal corporations.

Table A.5 Water supply service standards in the Ahmedabad Municipal Corporation

Activity	Time limit
Repair leakage in main line	2 days
Remedy contaminated water	1 day
Repair water stoppage	2 days
Repair of public standposts	3-5 days
Water connection	
Supply of application form	All working days (8 a.m. to 11 a.m. and 3 p.m. to 5 p.m.)
Acceptance of application	All working days (11 a.m. to 4 p.m.)
Acknowledgement of application	Immediate
Intimation to applicant in case of deficiency in application form	7 days
Depositing fees	7 days of receipt of application form
Giving connection	7 days of depositing fees

Source AMC(2000)

Fiscal framework

The corporation's activities are guided by its budget. Under Section 95 (Chapter IX) of the BPMC Act, the municipal commissioner is required to prepare an estimate of the expenses in the next financial year, balances available, receipt of revenue, and proposals for taxation. This is presented to the Standing Committee, which reviews it and sends it to the corporation for approval and adoption.

The accounts in the AMC are currently maintained on a single entry cash basis system. Since 1994/95, the corporation has been earning a revenue surplus, and is financially strong (Table A.6). The revised estimate of the cash surplus as on March 2000 is about 400 million rupees, this is expected to grow to 1832 million rupees by March 2001.

Table A.6 Financial summery of Ahmedabad Muncipal Corporation budget (rupees million)

Account head	1993/94 (actual)	1994/95 (actual)	1995/96 (actual)	1996/97 (actual)	1997/98 (actual)	1998/99 (actual)	1999/2000 (revised)	2000/01 (proposed)
Revenue income	2198	2855	3542	3872	4207	4750	6900	8173
Proportion of								

revenue income from taxes (%)	79.07	79.27	79.90	81.87	81.94	80.96		
Revenue expenses	2249	2477	2948	3219	3614	4189	5977	6817
Revenue surplus	-359	19	612	679	599	570	928	1357

Source AMC 1999a

At present, the AMC does not maintain separate accounts for activities undertaken in the water sector. The amount indicated under the head water tax and charge collection may not be a true indicator of the revenue from the water sector as it is based on the ratio of the rate of water tax to the property tax. Thus, if the water tax for an NRV (net rateable value) slab is 10%, and the total property tax in that slab is 30%, then one third of the property tax in this slab is apportioned to the water tax. The amount is then aggregated across all NRV slabs to arrive at the total collection of water tax and charge. Thus, the amount shown under this head is independent of the tax amount that is actually billed and collected as water tax.

It may be noted that most of the revenues in the water sector come from water taxes (Table A.7). The share of revenue being collected from metered connections is minimal.

Table A.7 Revenue collected from water services (rupees)

Component	1997/98	1998/99
Water tax	216,495,000 (88.92%)	233,725,000 (90.15%)
Water charge	21,893,000 (8.99%)	21,379,000 (8.25%)
Others	5,072,000 (2.08%)	4,159,000 (1.60%)
Total	243,460,000	259,263,000

Source AMC (1999)

The revenue expenditure during 1999/2000 under the head of water supply was over 10% of the total expenditure (about 438 million rupees). If this is compared with the tax collected under the water tax/charge head (Table A.7), the revenue collection is just over 60% of the revenue expenditure in the water sector. While the O&M (operating and maintenance) cost for providing water is Rs 2.70 per 1000 litres, the revenue collected is just Rs 1.60 per 1000 litres during 1998/99, implying that the corporation subsidizes water supply considerably. However, demand for the water taxes and charges for the

year compares well with the revenue expenditure in this sector (Table A.8). Since for the accounting purposes, major repair works are included under capital expenditure the revenue expenditure relates primarily to the O&M expenditure in this sector. Thus, it would appear that the subsidy in this sector arises from a low rate of recovery in taxes, and not underpricing of the service.

Table A.8 Summary of revenue expenditure and income in the water sector in the Ahmedabad Municipal Corporation

	1997/98	1998/99
O&M expenditure (Rs)	394,715,000	438,405,000
Debt servicing (Rs)	81,832,000	79,876,000
Total expenditure (Rs)	476,547,000	518,281,000
Revenue (Rs)	243,460,000	259,263,000
Water tax demand (Rs)	406,400,000	409,900,000
Water charge demand (Rs)	20,300,000	21,500,000
Total demand (Rs)	426,700,000	431,400,000
Ratio of revenue to O&M expenditure (%)	61.68	59.14
Ratio of revenue to total expenditure (%)	51.09	50.02
Ratio of revenue demand to expenditure (%)	108.10	98.40
Total water supplied (litres)	148,226,500,000	163,447,000,000
O&M expenditure per litre supplied (Rs per 1000 litres)	2.7	2.7
Total expenditure per litre supplied (Rs per 1000 litres)	3.2	3.2
Revenue per litre supplied (Rs per 1000 litres)	1.6	1.6

Source AMC (1999)

Municipal taxation

Under the BPMC Act, the municipal commissioner is to propose taxes and prepare an estimate of the revenue from the receipts of taxation. The Standing Committee, is thereafter required to propose, with reference to the provisions of Chapter XI (Municipal Taxation), such rates and extent of municipal taxes, as it thinks fit. Thereafter, the budget estimates are considered by the corporation every year that determine rates at which municipal taxes would be imposed during the next financial year. Among other taxes is the property tax, which includes water tax as one of the components.

The corporation imposes property tax under Chapter XI (Municipal Taxation) of the BPMC Act. Section 127(1)(a) enjoins upon the corporation to impose property tax. Under Section 129, the property tax consists of a water tax (Section 129[a]), a

conservancy tax (Section 129[b]), and a general tax (Section 129[c]). Thus, water tax is collected as a part of the property tax. The property is tax based on the NRV of the property. The corporation is required to fix the minimum rates of tax for different slabs of NRV with the approval of the state government (Section 129[a]). Keeping this minimum in consideration, the corporation is free to fix the tax rates. Thus, the corporation is more or less independent in the setting of water tax rates under the present legal framework.

The corporation can levy water tax only on properties that draw water provided by it. However, there are certain areas in the city where the municipal commissioner has issued a public notice stating that the corporation has arranged to supply water through house connections, tankers, or public standposts. In these notified areas, called the water zones, the corporation can levy a water tax irrespective of whether the property is connected to a municipal water supply or not (Section 130). The municipal commissioner annually notifies these water zones. Currently, industrial areas are not included under any water zone in the corporation. Thus, under this provision, major industries are exempt from paying the water tax. Additionally, Sections 134(1) and (3) authorize the corporation to charge for water on the basis of volume consumed or the size of the connection, in lieu of the water tax. Thus, in the present legislation, there are provisions for linking water tariff to water consumption.

The current water tax structure is given in detail in Table A.9. Apart from the water tax, a water connection charge is also levied.

As stated earlier, nearly all domestic connections in the AMC are non- metered, and are charged water tax based on the NRV. This is despite the fact that there is a provision for charging residential water demand on the basis of consumption under the provisions of Section 134 (Table A.9). There are about 6000 metered commercial connections in the city. However, it is reported that water charges collected from these metered commercial connections are also nominal as the minimum rate of tax for non-residential properties generally exceeds the water charge based on actual consumption. Thus, these establishments also pay the flat tax rate rather than the water charge.

Table A.9 Property tax rates in Ahmedabad Municipal Corporation (1997/98-2000/2001)[52]

Water tax	Tax rate
For residential properties	
1-100 sq m area (%)	15

[52] Annex A and Annex B are commercial and industry classifications based on the water consumed. For instance, water intensive industries like ice factories are listed in Annex A.

100-150 sq m Area (%)	17
150-200 sq m area (%)	20
Above 200 sq m area; except individual ly owned bungalow (%)	22
Above 200 sq m area; only for individual own bungalow (%)	25
Minimum rate of water tax per month	
For huts (Rs)	4.00
For other residential properties	
for 1-30 sq m area (Rs)	12.00
for 30-50 sq m area (Rs)	15.00
for more than 50 sq m area (Rs)	17.50
Non-residential properties	
Annex A type of usage (%)	25
Annex B type of usage (%)	30
Minimum monthly rate (Rs)	60.00

As Table A.9 shows, in the present scheme of water charges in Ahmedabad, water charges are not linked to the consumption levels.

With the new amendment of Gujarat Act No 3 of 1999, the calculation of property tax has been redefined under Section 141-B and the corporation has an option to calculate the property tax under Section 129 or under Section 141-B. The Ahmedabad Municipal Corporation is considering adopting the latter methodology in the next financial year. The corporation is yet to approve the revised rate of property tax as specified under the recent amendment of the BPMC 1949.

Under the new formula, the rate of tax is determined taking into account the following parameters.

- The market value of the land in the area where the building is located
- The age of the building
- Type of usage of the building
- Whether the building has been tenanted or not

The property tax is calculated as follows using the new formula.

$$\text{Property tax} = \text{Rate} \times \text{Area} \times (F1 \times F2 \times F3 \times F4)$$

where,

F1 is the market value of the land in the area where the building is located

F2 is the age of the building

F3 is the type of usage

F4 relates to whether self occupied or not.

It would thus appear that the new property tax formula would not give any indication of the water consumption at all. As mentioned earlier, even with the earlier procedure wherein the corporation used to determine the water tax on the basis of NRV, this anomaly existed. Also, commercial consumers currently pay water charges on the basis of water consumption, would have to pay a new rate with the introduction of the proposed property tax formula. In sum, the existing as well as the proposed property tax formula would not indicate level of water consumption in any manner.

Private sector participation

There has been no major initiative for attracting private sector participation in the water sector. The O&M of the newly constructed Kotarpur Water Treatment Plant has reportedly been contracted to a private operator. However, this is a relatively recent development, and on a considerably modest scale. This is in contrast to *Gujarat Infrastructure Agenda: Vision 2010* document, which had identified the Ahmedabad and Surat municipalities as forerunners in the privatization process in the water sector in Gujarat.

Conclusion

- Water supply functions in Ahmedabad are the responsibility of the municipal corporation. This was the case even before the enactment of the 74 Constitutional Amendment.
- Due to the overexploitation of groundwater in the state, there are concerns regarding water quality. It is important to substitute the use of groundwater with surface water. This would involve substantial investments in improving the efficiency of the current system and also developing river-based schemes. Here again, the role of the private sector is critical.
- The current water supply would fall considerably short of the water demand if supply were not augmented on an urgent basis. The GIDB estimates that this would involve investments to the tune of 3.75 billion dollars over the next decade. Even though the AMC is financially strong, the magnitude of investments would imply substantial commitment from the private sector.
- There are no service standards that the AMC is required to follow. However, standards for some of the services have been recommended in the Consumer Charter.

- The current demand for water tax and charges compares favourably with the O&M expenses. However, due to the shortfall in collection, the revenue from this sector falls short of these expenses. Thus, it appears that the subsidy for water supply arises from inefficiency in tax collection and not because of underpricing of water supply.
- The current tax regime is such that the total tax collected as water tax is independent of the consumption of water. Also, the new taxation methodology that has been proposed does not address this issue.
- Private sector participation in the water sector in the AMC is only in the discrete functions, such as pumping of water and operation of water treatment plants, even though the corporation has been identified as being favourably placed to attract such investment.

B Karnataka: case study on private sector participation in water sector

Introduction

In Karnataka, like in Tamil Nadu, there is a specialized agency at the metropolitan level the BWSSB (Bangalore Water Supply and Sewerage Board) responsible for provision of water supply, sewerage, and sewage disposal in Bangalore. In addition, a state-level specialist agency called the KUWSDB (Karnataka Urban Water Supply and Drainage Board) is associated with bulk water supply in some urban areas, while for the rest, the urban local bodies are responsible for provision of water supply to its consumers.

The BWSSB covers 482 square kilometres, within its jurisdiction, serving 5.2 million during 1997 (a population density of 10 809 persons per square kilometre). At present, Bangalore receives about 656 mld (million litres per day) of water through Cauveri and Arkavathy sources. Water is supplied on alternate days for about 3 hours each day in the city. About 60% of population has access to piped water supply. The per capita water supply per day during 1998/99 was about 100–110 litres, which is below the national standards recommended by CPHEEO (Central Public Health Environment Engineering Organization) i.e. 150–200 lpcd (litre per capita per day) for a city the size of Bangalore. Distribution of water to consumers is undertaken through direct tapping from transmission line, through ground-level reservoirs and overhead tanks, and through direct pumping from trunk mains into the distribution system using booster pumps. In the city, almost all the connections (about 300 000) are metered, and most of them are of 15-mm size. The BWSSB (created under the Bangalore Water Supply and Sewerage Act, 1964) maintains 6000 borewells with handpumps and 750 borewells with electrical pumps to supplement its water supply in densely populated areas. The board also uses tankers for supplying water to areas having water scarcity.

The KUWSDB constituted in 1975 has a jurisdiction over 208 urban areas in the state excluding Bangalore city and 7 other urban areas around Bangalore city, covering a population of about 12 million. It has the responsibility of formulation and implementation of water supply and drainage schemes in these areas. The responsibilities for maintenance of these schemes are with concerned local bodies while

the board maintains water supply systems up to the bulk supply point, in a few major cities, and in other cases, the distribution is required to be undertaken by the local bodies.

Private sector participation

In 1997, the GoK (Government of Karnataka) issued its Policy on Infrastructure which had outlined circumstances under which it could seek private sector participation in infrastructure projects. Private sector participation in such projects is also possible through execution of an MoU (memorandum of understanding) between the GoK and an investor under the following circumstances.

- Where the investor, on his own initiative, proposes a project which is visionary in nature or totally new in conception;
- Where the government has not contemplated offering any project to private sector because it did not appear to be commercially viable;
- All related subcontracts would be let out through competitive bidding; and
- The proposal would be developed by the investor at his own cost and resources.

The MoU is also expected to be valid for a limited period during which private investors would be able to achieve the project objectives; for example, preparation of a techno-feasibility report. The GoK is also committed to finalize such proposals within a time frame of 90 days. With the installation of the new government in December 1999, it once again reaffirmed its commitment to allow private sector participation in water sector in the state.

Following such initiatives, the GoK had invited proposals for ındepth studies in a few major cities for upgradation of the existing water supply and sewerage systems. A study was undertaken by M/s Anglian Water International covering four cities namely Mysore, Mangalore, Hubli-Dharwad, and Belgaum. The study revealed the following factors.

- Low per capita supply at tap in these four cities compared to Indian standards;
- Leakage ranging from 37% to 42% (highest in Hubli-Dharwad partly due to significant losses in the transmission main). Non-revenue water ranging from 51% to as high as 60% (in Hubli-Dharwad);
- 9% to 17% of annual expenditure accounted as repairs and maintenance, but a significant part goes to other uses;
- Revenue collection efficiency as low as 64% (in Hubli-Dharwad);
- Operational deficits ranging from 54% to 73% of total operating expenditure in Belgaum, Hubli-Dharwad and Mysore; and

- Mangalore is the only city having full cost recovery and higher service levels although the quality of treated water in Mangalore is the worst among the four cities.

The above study recommended the following approaches.

- Use of a public–private partnership approach through a JVC (joint venture company) with majority private ownership.
- Formation of an operating partnership between KUWSDB and M/s Anglian Water International.
- A simple management contract with a fixed or percentage fee for speedy implementation of projects duration up to 5 years.
- Parallel tariff reform, regulatory strengthening, and data gathering.
- Conversion of the management contract to a long-term lease by an agreed mechanism once the prerequisites are in place, say after 3 years.

Due to low tariff and high fix cost associated with technology transfer it was suggested that a city should have a population of at least 15 lakhs for such projects to be critically viable.

A similar study was also conducted by M/s Northumbrian Water Group in Davangere city in 1999. This study also stipulated a critical mass of around 10 lakhs population for a viable private sector participation in the water sector.

Further, private sector participation has also been attempted through various options in Bangalore city: a) BOOT (build-own-operate-transfer) contracts for provision of bulk water supply services, and b) through ROT (rehabilitate-operate-transfer) basis. These are illustrated below.

The BWSSB had already taken initiatives for private sector participation in sourcing water from Cauveri river. Under the CWSS (Cauveri Water Supply Schemes) Stage IV–Phase II, a proposal to transport 500 mld water at a distance of 98 km from the city is being considered under BOOT mode of private participation. Under the project, a private partner would lay a separate pipeline for bringing water to a treatment plan, pump and store the same at three stages, and finally, bring water to distribution points in the city. M/s Biwater Consortium has emerged as the preferred bidder in the competitive bidding process initiated by the board in 1997. The cost of supply of such water is expected to be Rs 23.75 per kilolitre. A final decision on the subject is awaited.
A need for remodeling and rehabilitation of water supply and sewerage system in Bangalore city is also being considered at a cost of about 800 crore rupees through public–private participation. It was felt that the present water supply and sewerage system in Bangalore city was outdated, and some of the facilities were also considered

to be overloaded. Since the facilities were provided about 8 to 10 decades back, their conditions had deteriorated about 30% of water supply distribution pipes have been encrusted with scales. These are often broken down, and therefore, equitable distribution of water resulting from low residual pressures to each of the service areas does not occur. Similar is the case with sewer pipes which are already blocked by silt, sludge, and garbage. In addition, some of the secondary and trunk sewer pipes are overloaded due to high population density. All these problems compelled the BWSSB to initiate a study to review and update the previous improvement plans of water supply, sewerage systems, and to prepare a phased programme for identifying priority projects. Thereafter, feasibility studies for these priority projects would be conducted including preparation of detailed project report and financial viabilities of such projects. It has been stated that the French government has agreed to grant a sum of 8 million French Francs to the GoK for conducting this study. Two firms have been identified, M/s Vivendi and M/s Lyonnaise dex Eaux, and each is likely to conduct the study covering 50 000 connections on the following issues.

- Determination of 'C' (coefficient of pipeline) value for all aged feeder mains and trunk mains over 50 years old.
- Proposal for rehabilitation or replacement of pipes depending on their conditioning.
- Inspection and test of all ground-level reservoirs that are over 30 years old, and suggestions for their rehabilitation or reconstruction.
- Identification of snags in water treatment plants and taking up their rehabilitation.

It is expected that once the above study is over, the GoK would enter into 'management contract' for 5 years with these two firms. The study is yet to commence.

The BWSSB has also initiated a proposal under BOOT mechanism for utilization of its treated water and use of recycled water for other purposes. A tertiary water treatment plant of 50 mld capacity has been proposed for implementation in Bangalore at K&C (Koramangala and Challabhata) valley. The Board had received bids from about 23 bidders, and the selection of M/s US Filters is under consideration. The cost of recycled water supply is approximately Rs 14 per kilolitre.

The O&M (operation and maintenance) contract for secondary sewage treatment plants of 163 mld capacity at K&C valley is entrusted to M/s Scamak Hi-tech Products, Bangalore; of 180 mld capacity at Vrishabavathi valley to M/s Sri Majunitha Enterprises, Bangalore; and of 60 mld capacity at Hebbal valley to M/s Mysore Construction Company, Bangalore. Further, O&M of 36 chlorinators has also been entrusted to M/s Engineers and Erectors.

Water tariff

Although the GoK had taken several policy initiatives to introducing a rational tariff structure for water services, a notable step in this direction can be seen in its comprehensive tariff order of 1996. The salient features of the order as applicable to all ULBs (urban local bodies) (except Bangalore city) are as follows.

- A minimum water rate on volumetric basis, which separately includes O&M and debt service charges, for each corporation was suggested.
- One time connection charges for domestic, non-domestic and commercial / industrial category were indicated. For instance, the corporation's domestic consumers are required to pay Rs 2000 as connection charges which is one-quarter of the charges levied for commercial / industrial consumers.
- Mandatory house connection irrespective of whether they are tenants/owners has been suggested.
- KUSWDB has been allowed to levy actual O&M cost, if the same is higher than the prescribed O&M costs whenever the board is entrusted for bulk water supply; in which case a MOU is to be signed between the ULB and board.
- ULBs have been directed to take over the O&M of schemes as completed by the board.
- It permits the board to hand over the water supply schemes that are maintained by it up to the consumer point to the ULB and to entrust the maintenance of such schemes to the ULBs.
- ULBs are required to collect water rate and remit the debt service charge components of such rate to the board.
- A meter at bulk supply point is required to be installed by ULBs for measuring the quantity of water supply by the board / local body.

- It intends to introduce meter system in all ULBs on 100% basis. Pending installation of meters, ULBs should fix a minimum monthly rate of Rs 45 per domestic connection. The ULBs are required to fix higher minimum charges depending on the debt service charge as applicable to them. Such rates for non-domestic or industrial/commercial consumers are also specified.

Under the Bangalore Water Supply and Sewerage Act, 1964, the BWSSB is empowered to collect water charges from its consumers at such rates, at such time, and under such conditions as may be specified by regulations. Water charges in the city collected every month are related to the level of consumption of water and no subsidy is received from the state government. The water tariff is linked to increments in

electricity charges, and also covers O&M and debt service charges for water supply. Tariff is revised regularly — during the last 15 years tariff revision had taken place 12 times. The basic philosophy behind tariff setting is that it should be self sustaining in domestic category of consumers. For the non-domestic and industry category, the water tariff subsidizes the losses, and also covers maintenance cost of public fountains. The revised water tariff order of July 1998 shows the following slab rates.

- Minimum tariff per kilolitre in domestic category is Rs 65 whereas it is Rs 275 in the non-domestic category;
- Rate for lowest slab (upto 25 000 kilolitre) in domestic category is Rs 3.50 kilolitre, as against Rs 33 for non-domestic category;
- Rate for highest slab (above 100 000 kilolitre) is Rs 33 while it is Rs 60 for the domestic category; and
- Further, the following are the rates/kilolitre for other categories – for industries (Rs 60), swimming pools (Rs 60), and public fountains (Rs 2680).

The recovery against demand for water consumption is satisfactory: against a demand of 69.55 crore rupees under the domestic and non-domestic consumers during 1998/99, the Board was able to collect about 90% of its dues.

Quality of service

The quality assurance wing of the BWSSD is responsible for checking water samples for potable use, and is also required to inspect the chlorinator systems. Water samples are tested in a central testing laboratory – of 14 833 water samples, only 977 samples were found unsatisfactory. The board follows the quality standards as set by CPHEEO. In contrast, water supplied by private tankers in Bangalore city have no assured quality. To improve customers' service quality and to address consumer grievances, the BWSSB has taken certain initiatives which include

- complaints of consumers regarding excess billing or billing disputes are heard and settled through an 'Appeals Committee' constituted by the board;
- meetings are conducted regularly at service stations for redressal of public grievances;
- a public relations officer in the head office also receives complaints and corresponds with the public.

General issues/comments

A need to promote efficiency and economy in the water supply system, and to conserve water has been recognized. At present, there exists no law prohibiting ground water

extraction except the fact that no two borewells should exist within a distance of one kilometre for irrigation purposes.

The BWSSB, which is the policy maker, regulator, and service provider of water services in Bangalore city, is mandated to be guided by such directions on questions of policy as may be given by the state government in consultation with the board.

Lessons for Gujarat

- The process of private sector participation will require credible basic information on the water systems in any ULBs. Use of consultants to gather such information before inviting bids for long-term contracts will reduce substantial risk-sharing by the private partner. However, such efforts could be expensive and time-consuming, and such information as provided by the consultants should be of a high credible level. Further, assistance to ULBs for conducting such studies need to be arranged.
- The decision-making process for selecting a bidder should be transparent otherwise, the credibility of the regulatory framework before the potential investors would be at stake.
- Selecting bidders on competitive basis would give best value for money, and will ensure competition for the monopoly water market.
- Lack of capacity in managing private participation in smaller urban areas can be avoided through use of suitable technical assistance / expert advice, at least as a short term measure.
- Use of BOOT for augmenting sources of water, or ROT for old distribution network could be alternative options for private sector participation.
- Political interference in tariff setting could be minimized if an independent body sets the tariff, or tariff-setting procedures are clearly spelt out in contracts. However, in the latter case, the contract may fail to subsume unpredictable developments in the sector.
- Tariff revision procedures should be transparent and tariff should be inflation indexed. In Karnataka, the government has authorized the BWSSB to revise proportionately without any further reference to government as and when the Karnataka Electricity Board increases its power tariff. Further, an understanding of consumers' affordability to pay is required for determining the tariff rates.
- Need for clear assessment of service costs through proper accounting is required, to help monitor costs as well as to determine the tariff levels for water services.
- Service taxes (often linked to annual ratable values) does not ensure demand management for water services, and hence, should be coupled with user charges.
- Water quality standards must be specified and enforced.

- Improvement of water services at consumer end can be brought in through enforcement of a 'Citizen's Charter' for better services on the part of the urban bodies. Regulator may help in setting such standards and their enforcement.
- Financial viability of ULBs can only be achieved if tariff for water services reflects the cost of such services.

C Metro Water: a case study

Introduction

Tamil Nadu, in South India ranks seventh in population and eleventh in area amongst all states in India (1991 census). Its capital, Chennai, is the nation's fourth largest metropolitan area. The population of the CMA (Chennai Metropolitan Area) is 5.9 million (1991 census): 3.8 million from the CMC (Chennai Metropolitan Corporation) and 2.1 million from surrounding jurisdictions covering 6 municipal areas, 3 municipal townships, 27 town panchayats, 10 panchayat unions, and 1 cantonment board. Chennai, an administrative and commercial centre, has a number of industries including the port, textiles, electrical equipment, machinery, and vehicles with petrochemical and fertilizer industries in North Chennai.

Institutional structure

The TWAD (Tamil Nadu Water Supply and Drainage Board) is the nodal agency for the water sector in Tamil Nadu. Municipalities are responsible for providing water supply in urban areas though for a few of the larger cities special purpose entities have been established, for example, the CMWSSB (Chennai Metropolitan Water Supply and Sewerage Board) or Metro Water in Chennai.

With the exception of the CMA, the statewide responsibility for planning, design, and construction of water supply and sewerage systems rests with the TWAD. The TWAD was established in 1971 for the purpose of regulating and developing drinking water and drainage investments in the state. The responsibility for irrigation systems rests with the irrigation wing of the state government's PWD (Public Works Department), reorganized in early 1995 into the WRO (Water Resources Organisation). Generally, after commissioning, the TWAD hands the projects over to local bodies for operation and maintenance.

Chennai has its own water supply company, Metro Water. Metro Water was formed as a statutory body in 1978, and assumed the responsibilities of water supply and sewerage collection, formerly held by the municipal corporation. Metro Water is responsible for water supply in the CMA, which includes Chennai city, 20 urban local bodies (referred to as adjacent urban areas and distant urban areas), and other villages. It is also responsible for the collection, treatment, and disposal of sewage in the CMA. The total geographical extent of the CMA is 1172 square kilometres and that of Chennai city

is 170 square kilometres. At present, Metro Water's operational area is restricted to Chennai city and parts of few adjacent local bodies, a population of about 5 million.

The state government appoints the Chairman and Managing Director of the Metro Water. The Secretary to Department of Municipal Administration and Water Supply and other senior secretaries are its directors.

Legislative framework

The water sector in Chennai is regulated under the provisions of Act No. 28 of 1978, also known as the Chennai (earlier Madras) Metropolitan Water Supply and Sewerage Act 1978 (or the CMWSS Act). Section 5 of the CMWSS Act lays down the functions of the board. These include the following.

- Promote or secure planned development of the water supply system
- Prepare long-term plans to meet future requirements
- Undertake developmental activities to meet future requirements
- Operate and maintain the water supply services
- Any other function relating to water supply as the (state) government may entrust.

With the enactment of the CMWSS Act, Metro Water was given all existing responsibilities, powers, controls, facilities, services, and administration relating to water supply and sewerage in or for the CMA. It was also given the responsibility to enlarge, improve, or develop existing facilities and to construct and operate new facilities.

Interestingly, Section 5(6)(2)(v) gives Metro Water the power to control extraction, conservation, and use of underground water in the CMA. Similarly, according to Section 51(1), 'the board may in public interest and with the previous sanction of the government, regulate, control and charge for existing or future extraction, conservation, and use of underground water in any form of purposes'. There are a number of other such provisions in the CMWSS Act that permit the board to regulate the extraction and utilization of groundwater resources.

Apart from the provisions in the CMWSS Act, the state government has also enacted groundwater legislation, Act No. 27 of 1987 or the Chennai (formerly Madras) Metropolitan Area Groundwater (Regulation) Act (or the CMAGR Act). Tamil Nadu is one of the few states to enact such a legislation. The primary objective is to conserve groundwater and to maintain the fragile sea water–freshwater interface in the coastal belt. Metro Water is enforcing the CMAGR Act. According to Section 2(j), 'no person shall sink a well in the scheduled area (the city of Chennai and some surrounding villages) unless he has obtained a permit in this behalf from the competent authority'.

Also, according to Section 4, the board is required to collect and maintain information on the number of wells in it jurisdiction and the quantity of water drawn. The drawing of groundwater for purposes other than drinking is restricted under the Act.

Overview of the water sector

Chennai's water deficiency can be ascribed to the fact that the city lies in a rain shadow with no major river systems supplying surface water. Metro Water has started implementing a master plan to increase Chennai's capacity to draw, treat, and distribute additional water flows from Krishna river and rectify inequitable. distribution, low pressure, leakages, and losses by strengthening the distribution system. This section reviews the services provided by Metro Water in Chennai. The growth of Metro Water is presented in Table C.1.

Table C.1 Metro Water: growth profile

Parameter	1978	1998	1999
Population served (million)	2.8	5 (city + AUA[a])	–
Treatment capacity (mld[b])	182	620	620
Water production (mld)	180	440	485
Length of water mains (km)	1250	1795	1853
Water connections (number)	116 000	209 000	228 876
Distribution stations (number)	3	7	10
Staff productivity			
Staff strength	5659	5658	5846
Staff per 1000 connections	49.00	27.58	25.09
Staff per mld of water	31.00	12.33	12.10
Staff per kilometre of water pipe	4.50	3.20	3.00
Population served per staff	618	728	742

[a]adjacent urban area; [b]million litres per day
Source Metro Water (2000)

Water sources

Water supply for Chennai is currently obtained from 13 groundwater sources (wellfields), and three interconnected reservoirs at Poondi, Cholavaram, and Redhills. The dependable safe yield from surface storage is estimated at 227 mld (million litres per day). The wellfields yield 70 mld though their potential was estimated at 169 mld. A reassessment of this potential is to be taken up soon under the ongoing World Bank aided Second Chennai Project. When fully operational, the Krishna water source will add about 930 mld. The water sources are described in detail below.

Surface water

Chennai city depends mainly on surface water for its water supply. The three surface storage lakes are located outside the city. Water from Krishna river from Andhra Pradesh is a recent addition (1998). The surface water sources, that is, the three storage lakes (interlinked by open channels) at Poondi, Cholavaram, and Redhills, and the canal (inside Tamil Nadu) from Krishna river which terminates in the Poondi reservoir, are maintained by the WRI. A fourth lake at Chembarambakkam, which has hitherto been used for agricultural purpose, is also proposed to be used to supply drinking water to the city in view of the current drought. These surface storages are dependent on monsoons. Table C.2 gives the maximum capacity of storage reservoirs.

Table C.2 Maximum capacity of the storage reservoirs (million cubic feet)

Lake	Maximum storage capacity
Poondi	3231
Cholavaram	881
Redhills	3300
Total	7412
Chembarambakkam	3645

Source Metro Water (2000)

Groundwater

Groundwater is mainly used by Metro Water from six areas (wellfields) in the Araniar–Kortaliyar river basin, located at about 50 km north of the city, for supply to the water-intensive major industries in the north of the city.

A recent survey of consumers carried out by Metro Water has found that many have their own supplies of groundwater obtained from shallow wells which, for the domestic sector, are used for washing and cleaning leaving the piped supply for drinking and cooking.

Recycling and conservation

As a water conservation measure, check dams across Kortaliyar river have been constructed which has resulted in the raising of the water Table C. in the wellfields. Also, rainwater harvesting has been made mandatory in the development of new properties such as multi-storey buildings. Finally, a small quantity (about 20 mld) of secondary treated sewage effluent is also supplied to the industries. For conserving and recharging groundwater reserves, no licences for groundwater extraction have been given after 1996.

Water distribution network

For the management of water supply and sewerage, the city is divided into 10 areas and 155 depots, the jurisdiction being coterminous with that of the CMC zones and unit offices, respectively. An area is managed by an Area Engineer of the rank of an Executive Engineer. The first level unit office called a depot is managed by the Depot Engineer of the level of an Assistant Engineer.

Chennai city, faced with severe source constraints, is the only metropolitan city in India that had a supply of less than 100 lpcd (litres per capita per day). The city water distribution system, dating back to several decades, could not cope with the rapid growth both in population and geographical spread.

A Master Plan for Water Supply and Sewerage Systems was prepared for the entire CMA in 1978, which was revised in 1991 and further updated in 1997. This Master Plan envisages dividing the entire city into 16 district water supply zones. Each of these zones will have an independent water distribution station and network. Additionally, a modified transmission mains system linking the water treatment plants to the distribution zones has been proposed.

The works proposed in the Master Plan are being implemented in stages. All the major works contemplated have been taken up for implementation. A new Water Treatment Plant of 300-mld capacity, major part of the transmission mains, and five new water distribution stations have been completed. Seven stations are nearing completion. Revamping of the water distribution network in 11 zones is in progress.

Leak detection and repair works covering 35% of the area of the city in three phases have already been completed. For the remaining area, the works are now in progress. The water conservation effort under this ongoing programme envisages replacement of all the house service connection, identified as the major source of leakage due to corrosion of the galvanised iron of the pipe connecting with MDPE pipes.

All the above ongoing works relating to the water supply distribution and leak detection and repairs are expected to be completed and commissioned progressively by the year 2002.

Water demand

During the year 1998/99 (till January 1999), an average supply of 440 mld to the city for domestic use and about 50 mld for the industries was maintained. The per capita supply, which was about 70 lpcd in 1998 was increased to about 100 lpcd during 1999. Due to a poor monsoon in 1999, the city supply dropped to about 255 mld for domestic use and about 50 mld for industrial use.

The maximum availability of water for Chennai from existing sources is about 70 lpcd inclusive of demands by industry and other non-domestic consumers. The corresponding Figures for other cities are 253 lpcd for Mumbai, 220 lpcd for Delhi, 190 lpcd for Calcutta, and 125 lpcd for Bangalore, making Chennai the most water-deficient metropolis in India. The average per capita domestic daily availability in Chennai is only 47 litres, which is well below the Indian standard of 70–100 lpcd for individual connections in urban areas and 50 lpcd for consumers using stand pipes.

In years with poor monsoons, water supply is reduced to one to three hours on alternate days. Occasionally, this low level of supply for domestic use can only be maintained by restricting industrial water supply requiring industries to curtail or even cease their operations. Failure of the monsoon combined with the practice of overdrawing from the reservoir system has in the past resulted in almost complete depletion of the storage reservoirs.

Water treatment

Metro Water supplies drinking water of the standard recommended by the CPHEEO (Central Public Health Environmental Engineering Organisation). Section 5(2)(a) of the CMWSS Act requires Metro Water to 'have due regard to public health, safety and convenience of the public' in discharge of its functions. Section 42(2) requires that 'the water supplied for drinking purposes is at all times wholesome and fit for domestic consumption'. The quality control of water is exercised by the Quality Assurance Wing. The main functions include the following.

- Monitoring raw water quality in the surface water sources at Cholavaram and Redhills lakes, and Krishna water, in the groundwater from the wellfields, that is, Minjur, Panjetty, Thamaraipakkam, flood plains, Kannigaipper, Poondi, south coastal aquifer, and sea water intrusion.
- Monitoring the treated water quality at the water treatment plants in Redhills and Kilpauk and in the ancillary headworks.

- Ensuring adequate level of disinfection even at the tail end of the distribution network, around 100 samples are tested daily for residual chlorine from various locations in the city.

Automatic chlorinators are installed at various points in the distribution network of the city for effective dosing with chlorine so as to ensure the requisite disinfection level in the city distribution system. The functioning of these chlorinators is regularly monitored. Samples from the general public are tested against nominal charges and suggestions provided towards improvement/ treatment of quality for drinking, construction, and other industrial uses. Table C.3 provides the percentage of samples tested with less than 0.2 ppm chlorine by area.

Pollution Monitoring Unit with mobile laboratory provides the expertise to depot engineers in pinpointing the source of pollution. By coordinating with the Communicable Diseases Hospital, the incidence of water-borne diseases is monitored and controlled by increasing the level of chlorine in the distribution network whenever and wherever required.

Table C.3 Report of residual chlorine by area for April 2000

		Residual chlorine less than 0.2 ppm[a]	
Area	Total number of samples	Number of samples	Percentage of total samples
1	186	35	18.82
2	85	10	11.76
3	359	12	3.34
4	116	5	4.31
5	358	16	4.47
6	140	5	3.57
7	120	3	2.50
8	117	0	0.00
9	153	6	3.92
10	225	10	4.44
Total	1859	102	5.49

[a] part per million

Source Metro Water (2000)

Quality of service

With the execution of the Master Plan by 2002, the physical constraints in the distribution of supply will be removed. However, apart from removing the physical bottlenecks in providing improved water supply, Metro Water recognizes the need to

improve the quality of service. Several initiatives have been taken to strengthen the consumer interface. These relate to simplification of procedures for getting the service connections, payment of water charges and taxes, information on arrears, etc.

For instance, the consumer services application, which was in the form of a bulky booklet, has now been simplified and reduced to a one-sheet form. In this application, the rates for services have been provided so that the charges payable for the service connection can be worked out by the applicant himself. The time limit for the provision of service has also been indicated.

To make Metro Water more accessible to the public, a number of initiatives have been undertaken. These include an interactive voice response system through which the status of arrears can be ascertained by a consumer and a web site from which information regarding the CMWSS Act, tenders invited, water and sewer applications, etc., can be accessed and downloaded by consumers.

Citizens Charter

Metro Water brought out the Citizens Charter in April 1998 laying down standards of services and commitment (Table C.4). Metro Water is the first water utility in India to publish a Citizens Charter setting the standards for various services provided to the consumers. The objectives of the Charter are defining the standards of service delivery, and developing transparent administration by taking the consumer into confidence. The following standards of service are detailed in the Citizens Charter.

A reliable water supply

Wherever the pipe network is absent, Metro Water shall supply good quality drinking water by tankers.

Limiting service interruptions

- Metro Water will be on call 24 hours, 7 days a week, and have senior personnel available to respond to service emergencies.
- Metro Water will be on-site to undertake repairs within 6 hours of a serious water service fault.
- Metro Water will make every effort to limit an interruption to not exceed 6 hours.
- Metro Water will provide drinking water on request if an interruption exceeds 6 hours.
- When Metro Water needs to undertake planned service interruptions, at least 24 hours notice to domestic customers and at least 3 days notice to industrial customers would be provided through newspapers.

Assisting with accounts

Metro Water will be available to assist customers with respect to their accounts enquiries on weekdays during working hours at the head office as well as area offices.

Responding promptly

- Metro Water will reply to all written customer enquiries within 10 working days.
- Metro Water will endeavour to answer all telephone calls within 90 seconds and to answer the majority of these calls within 30 seconds.

Table C.4 Service standards

Service	Standard
Water connection / sewer connection	
Free supply of application forms at head office, area offices, and depot offices	Working days (10.00 a.m.-3.00 p.m.)
Registration of application forms (acceptance of application) at head office	Working days (10.00 a.m.-3.00 p.m.)
Issue of challan for depositing connection charges	On the spot at the time of registration
Intimation to applicant in case of deficiency in Application form	Within 7 days from the date of registration
Issue of work order	Within 7 days in the case of single dwelling up to 200 square metre plinth area Within 45 days for other cases
Water supply	
Replacement of defective water meter	7 days
Complaint regarding leakage	
Services lines (main)	3 days
Distribution main	5 days
Transmission main	7 days
Complaint regarding pollution (contaminated water / quality of water)	
Where pollution point is easily identified	7 days
Otherwise	15 days
No water supply / defective water supply	5 days
Repairs	
Hand pump	2 days
India Mark II pump	5 days

Source Metro Water (2000)

Consumer complaints redressal

Complaints receiving points

A Central Complaints Cell is functioning in the head office round-the-clock with two dedicated telephone lines. Complaints are also received in all the ten area offices. Consumers also have access to the telephones of the Managing Director and the Chief Engineer (O&M).

Complaints redressal mechanism

Immediately on receipt of a complaint in the Central Complaints Cell or at the head office, the complaint is recorded, a number is assigned, which is informed to the consumer for his reference and follow-up, and then the complaint is transmitted to the respective area office by wireless. The area offices in turn pass on the message to the unit office (depot).

The complaints received in the Central Complaints Cell are recorded in a three-part form. One part is retained in the Cell. The other two parts are sent to the respective area office the same day. After attending to the complaint, the third part containing the feedback acknowledgement slip is returned by the area office to the Complaint Cell where a closing entry is made. Similar data on the complaints received in the area office is also sent by the area office to the Cell.

At the area office, a similar procedure of preparing duplicate complaint form is followed in respect of the complaints received. The original complaint forms with the signature of the complainant are sent to the area office. The duplicate copies are retained in the depot.

Complaints Cell monitoring

The Information and Facilitation Officer at the head office, who is monitoring the functioning of the Complaints Cell, processes the complaints redressal and prepares a weekly statement on the status of complaints. This statement is reviewed by the Managing Director every week with reference to the standards set in the Citizens Charter. The performance on the consumer service with reference to the Citizens Charter is reviewed by a Citizens Charter Review Committee chaired by a well-known public activist and has as members representing consumer fora, and public, besides three officials of Metro Water. A consolidated monthly report is published in the house

journal that is also made available to the public. Quarterly reports on the status of complaints are furnished to the state government as well.
Metro Water has also implemented a complaint monitoring software, which enables them to keep track of complaints and its recurrences. Based on the information obtained from the consumers in the form of complaints, feedback, and suggestions, strategies are evolved for betterment of services.

However, it must be noted that the standards of service are not a statutory requirement. In fact, Section 44(2) states that 'the board shall not be liable to any penalty or damage for cutting off the supply of water, or for not supplying water in the case of unusual drought, or other unavoidable causes, accidents, replacements, extensions, or the necessity for relay or repairing of pipes'.

Fiscal framework

Metro Water has been earning a financial surplus for the last seven years. This has resulted in the board being allowed to function largely in an autonomous manner without any interference from the state government. This financial strength is also in consonance with Section 5(4) of the CMWSS Act which states that 'the board shall endeavour to be financially self supporting'. This has largely been ascribed to a rationalization in the water tariff in terms of increase in the domestic water tariff. This has resulted in the ratio of revenue collected from industrial and commercial consumers to that collected from domestic consumers falling from a high of 5.60 to just over 3 between 1992/93 and 1999/2000. The rate of collection maintained by the board is also good at 92% for 1999/2000 and 89% for 1998/99. Finally, metering has been promoted in areas where adequate water supply has been assured.

The net surplus in 1998/99 was estimated to be about 222 million rupees, a drop from over 440 million rupees in 1997/98 (Table C.5).

Table C.5 Financial summary of Metro Water (million rupees)

Parameter	1998/99	1997/98
Income	1736	1626
Expenditure	1514	1186
Surplus	222	440

Source Metro Water (2000a)

The revenue from the sale of water supplies comes largely from metered water connections (Figure C.1). Interestingly, Section 47(2) of the CMWSS Act states that

'where so required by the board, meters shall be installed by the owners of the premises concerned'. Thus there is legislative support for universal metering in Chennai. Commercial consumers comprise the bulk of the metered connections in Chennai (Table C.6). However, as a proportion of the total revenue collected from all metered consumers in the city, commercial consumers currently account for only a marginally higher proportion than industrial consumers (Figure C.2).

Table C.6 Metered connections in Chennai

Type	Numbers
Commercial	3920
Partly commercial	5380
Institutional (government)	578
Municipal bulk supplies	2
Industrial	39

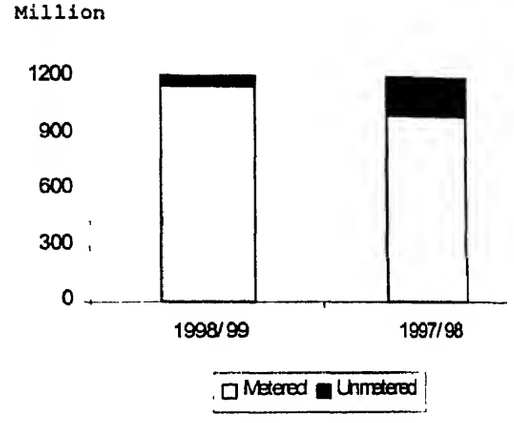


Figure C.1 Income from metered and unmetered connections

(million rupees)

Source Metro Water (2000a)

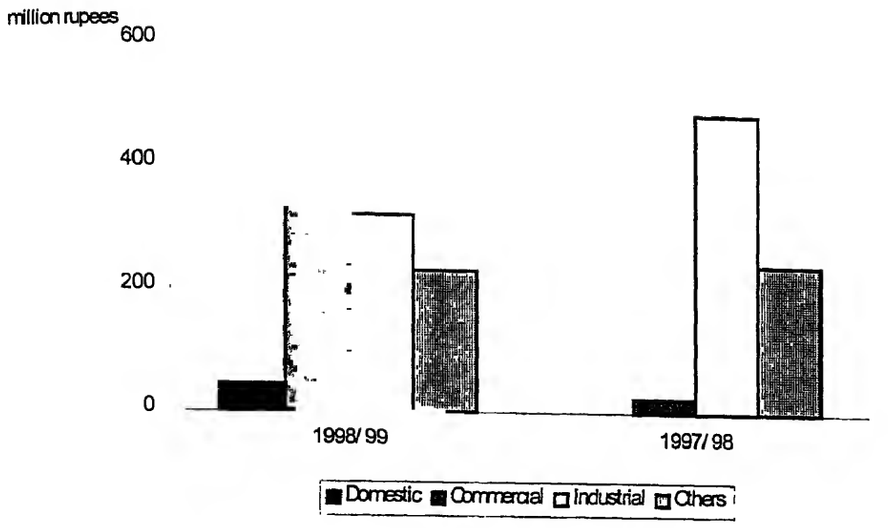


Figure C.2 Income from various types of metered connections (million rupees)

Source Metro Water (2000a)

Amongst unmetered consumers, the bulk of the revenue is accounted for by domestic consumers (Figure C.3). Notably, recycled water accounts for a sizeable proportion of the total revenue collected.

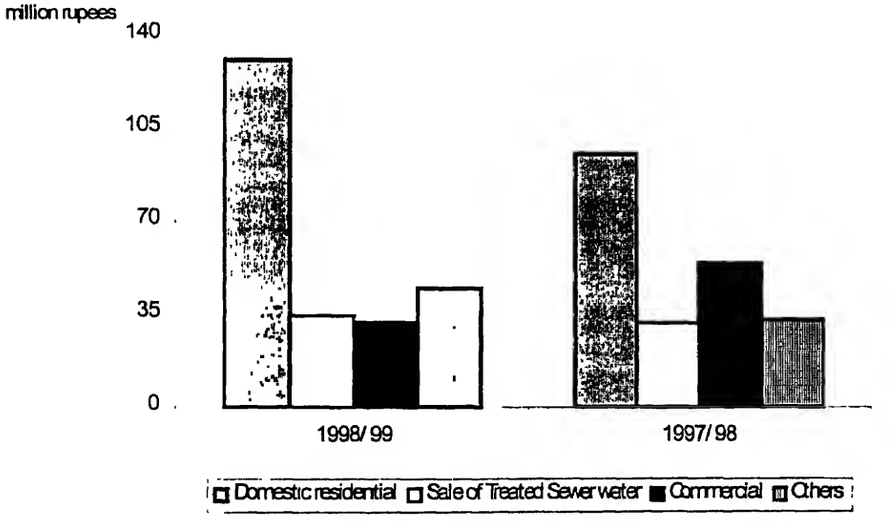


Figure C.3 Income from various types of unmetered connections (million rupees)

Source Metro Water (2000a)

Also charges are levied in Chennai for the provision of water services. This is done in two ways. First, there is a water charge that is levied on all consumers with a water connection. Second, there is a water tax that is levied as per Section 34(a) of the

CMWSS Act. The historical origins of this tax are in the property tax that was collected by the municipal corporation prior to the setting up of the board. Subsequently, this was passed on to the board on its formation. This has historically been 5.5% for water and 1.5% for sewerage making a total of 7% of the Annual Rateable Value.

Till 1997, the board required the approval of Tamil Nadu government before effecting a change in the tariff rates. While it could 'determine, levy, and collect taxes, rates, fees, charges, surcharges, rents, and costs and expenses' (Section 5(6)(2)(xii) of the CMWSS Act), it required the approval of the state government before notifying the rates. With the enactment of the Act Nos 56 and 58 of 1997, the board has complete autonomy in fixing water charges. The Act Nos 56 and 58 of 1997 have amended the Chennai Metropolitan Water Supply and Sewerage Act 1978 and authorized the board to determine the manner and basis of levying and collecting tax, charges, surcharges, fees, rents, and other amounts, maintaining and regulating connections and fees for connection and re-connection of water supply and sewerage. The current water tariff for metered and unmetered consumers is given in Table C.7 and 8. Sewerage charges are 25% on water supply charges wherever sewer connections are provided.

Table C.7 Water tariff for metered consumers

Category	Quantity (kilolitre)	Rate (rupees per kilolitre)	Minimum charge per month(Rs)	Frequency
Domestic	Up to 10	2.50	50.00	Monthly
	10-15	10.00		
	15-25	15.00		
	Above 25	25.00		
Commercial	Where monthly consumption (non-water intensive) exceeds 500	25.00	200.00	Monthly
	Where monthly consumption (water - intensive)[a] exceeds 500	40.00	400.00	Monthly
Partly commercial	Up to 10	5.00	150.00	Monthly
	10-15	15.00		
	Above 15	25.00		

Institutional	Entire consumption	20.00	200.00	Monthly
Municipal bulk supply	Entire consumption	15.00		Monthly

[a]Water-intensive means premises used fully or partly as theatres, hostels, boarding houses, lodges, clubs, private hospitals, private hostels, kalyanamandapams, clinics with inpatient facility, baths, places for keeping animals, vehicles service stations, nurseries.
Source Metro Water (2000a)

Table C.8 Water tariff for unmetered consumers

Category	Water charges (Rs per month)[a]
Domestic	50
Commercial	
Non-water-intensive	200
Water-intensive	400
Partly commercial	150
Institutional	200
Public supply tubewell pumps or Mark II pump	40

[a]The frequency of billing is half yearly
Source Metro Water (2000a)

In addition, special services are charged for in the following manner.

- Public supply (hydrant and public fountains): Rs 400 per fountain per month including maintenance charges (monthly)
- Mobile water supply to slums: Rs 4 per 1000 litres for the entire quantity supplied (monthly)
- Maintenance charges for steel tanks: Rs 200 per month per tank (monthly)
- Casual water supply — Mobile water supply to customers
  - Rs 300 for every load up to 6000 litres
  - Rs 450 for every load up to 9000 litres
  - Rs 600 for every load up to 12 000 litres

Private sector participation

Metro Water has been one of the pioneers to initiate privatization in the operation of public water utility. There was no legal barrier to PSP (private sector participation) in this sector. Section 5(6)(2)(ix) of the CMWSS Act empowers the board to enter in to contracts, agreements or arrangements with any person, firm, or organization.

The objectives for PSP, as identified by Metro Water are listed below.

- Explore the areas of involvement where it will promote economy and operational and managerial efficiency.
- Develop a suitable contractual framework for involving the private sector based on the experiences gained in the initial efforts.
- Make O&M an integral part of the contract package for construction of new facilities.
- Evolve a suitable longer time frame for the contract as against the shorter duration of one to three years involved in the initial efforts.
- Seek long-term involvement of private sector in the construction, operation and maintenance of new water and sewerage facilities on BOT (build, operate, and transfer / BOOT (build, operate, own and transfer) basis.

The privatization efforts relating to O&M functions cover all areas of activities in varying degrees. These include source, production, treatment, and distribution of water, financial accounting, etc.

Water source

One of the efforts in involving the private sector in water sources relate to drawing of groundwater from the borewells owned by agriculturists during the drought situation in 1987. This was a short-term proposal involving 12 wells which supplied about 3.3 mld water.

Production and treatment

Operation and maintenance of 29 borewells in two aquifers (Tamaraipakkam and Poondi) has been entrusted to a private contractor. Operating personnel are provided and minor repairs attended to by the contractor. However, the energy cost is met by the board. The contract for this has savings of about 56% of total cost of O&M.

In addition, the O&M of the water treatment plant at Redhills is entrusted to a private contractor. Operating personnel, supply of chemicals, minor repairs to equipment, and meeting the prescribed water quality standards, are the private operator's responsibility. The power cost is met by the board.

Distribution of water

Water is transported through tankers for filling the static tanks located in areas where there is inadequate supply through mains during drought, where economically weaker

sections are located, etc. The water tanker service has been contracted out. It was discovered that vehicle repairs were 3% of the O&M costs and vehicles were off the road for half the time. Metro Water disposed of 59 vehicles and is now hiring vehicles, in particular, tankers. This transportation has been privatized. At present, 338 tankers are hired from 220 agencies.

The privatization of tanker operations is the earliest privatization efforts taken more than 13 years back. In view of the regularity of the operations, the cost quoted by the operators has been gradually decreasing in spite of the increase in cost of inputs like diesel. However, given the primitive form of PSP in this case, regulation is hardly an issue.

Reverse osmosis plants

The project involving reverse osmosis plants was initially being developed as a BOOT project. However, this did not work out and was subsequently given on an O&M contract. Three small reverse osmosis plants of capacity 150 000 litres per day, designed to supply water to the local community, are under privatized maintenance by the contractor who erected the plant.

Regulatory oversight

With PSP in only discrete function in the water supply sector, active regulation in the sector is not required. Currently, Metro Water performs most of the regulatory activities in this sector. These activities largely relate to monitoring the compliance with the terms and conditions of the contract.

Apart from regulating private operators in the sector, there is another regulatory issue peculiar to Chennai. As the board is an autonomous and independent body directly under the control of the state government, there is no statutory involvement of the local body in the functioning of the board. This is despite the enactment of the 74th Constitutional Amendment. The board has sought to resolve this issue by forming joint council with the local body for its day-to-day functioning. The joint council formed by the board with the corporation meets once in three months to sort out coordination issues with the corporation. This is chaired by the Mayor. Also, local councillors are members of this body. In addition, there are ward-level committees which deal with local issues of coordination with the elected representatives.

Lessons for Gujarat

- Regulation of the use of groundwater is essential for sustainable use of water resources. This is feasible once legislative support is available.

- To effectively convey the benefits of any improvements in water supply to the final consumers, issues related to the quality of service would need to be addressed in detail. Here Metro Water's efforts at providing better consumer service, as detailed in its consumer charter, are important.
- Metro Water has a competent complaint redressal mechanism, which includes an extensive review of the complaint redressal process using modern information technology. This is one area in which the local bodies in Gujarat could learn from the experience in Chennai.
- The CMWSS Act gives Metro Water functional autonomy and independence. This kind of independence would have to be ensured for the efficient functioning of any such corporate body.
- Financial viability of the water supply agency is essential to ensure functional autonomy. This also ensures that the confidence of private operators is maintained.
- The CMWSS Act provides for compulsory metering if Metro Water so desires. This kind of provision should be considered for the local bodies in Gujarat also.
- To ensure the political acceptability of any commercialization or privatization scheme, there should be a continuous stakeholder involvement in the management of the operating systems.

D Case study of the Rajkot Municipal Corporation

Rajkot is situated in the heart of the Saurashtra peninsula at 22 1'N and 70 45'E, 225 km south-west of Ahmedabad. The temperature varies between 43.5 C and 24.2 C. The average annual rainfall is 500 mm. However, out of the last 60 years, rainfall has been below normal in 22 years. In fact, the average for the last 7 years is only about 300 mm.

The population comprises nearly 5% of the total urban population of Gujarat. The total area under the RUDA (Rajkot Urban Development Authority) is 483 sq km. This includes the RMC (Rajkot Municipal Corporation) area (104.86 square kilometres) and surrounding 39 villages. The present RMC population is around 850000. The population of the rest of the RUDA area is less than 100000. It is estimated that by 2011, the population would become about 1200000.

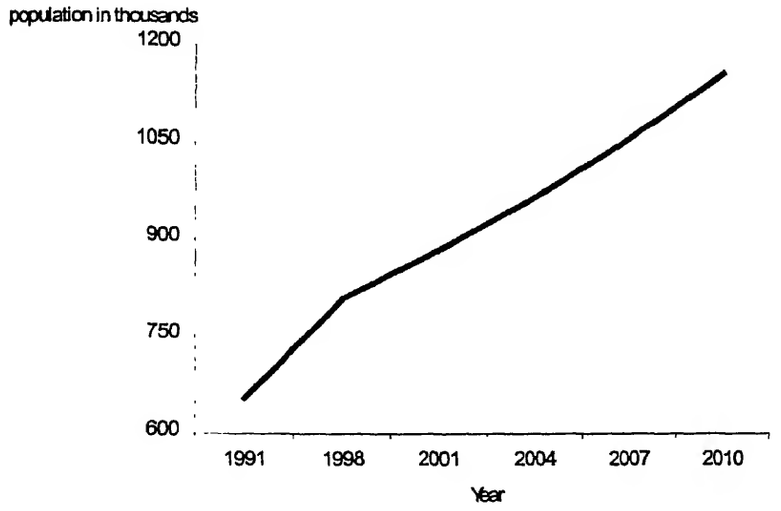


Figure D.1 Population projections for Rajkot (thousands)

Source GIDB (1999)

Institutional framework

The RMC was formed in 1973 under the provisions of the BPMC Act, 1949 (Bombay Provincial Corporation Act). Prior to this, the municipality carried out the civic functions. As per the BPMC Act, the RMC consists of two wings, the legislature and the executive. The municipal commissioner is the chief executive of the corporation and exercises all powers that are delegated to the municipal corporation.

As with other municipal corporations in Gujarat, the RMC is responsible for providing water supply and sewerage services as part of its obligatory duty under Section 63(20) of the BPMC Act.[54] This provision of water supply under the obligatory function of the municipal corporation existed even before the enactment of the 74th Constitutional Amendment (1993).

The municipal corporation's elected wing is called the General Board of the Corporation. The mayor chairs the General Board, which is the apex body of the corporation. From this General Board, the Standing Committee is constituted under the provisions of Chapter II Section 4(1) of the BPMC Act. Water services, like other municipal services, are under the scrutiny of the Standing Committee comprising 12 members and 1 chairman. It has the power to recommend the budget, including water tariff to the General Board. Other (non-statutory) committees are established by the corporation under Section 30(1). The non- statutory committee that deals with the water sector is called the Water Works Committee. The General Board, the Standing Committee, and the Water Works Committee share the statutory powers of the corporation for the provision of water services. The authority to determine all tariff-related issues, including water tariff and water charge, rests with the Standing Committee and the General Board. The Water Works Committee, with five members, has limited powers to recommend and sanction projects worth more than 300000 rupees.

In the provision of water services, the municipal commissioner is assisted by the deputy municipal commissioner (technical). The deputy municipal commissioner is assisted by four city engineers, who are in turn assisted by deputy executive engineers. The staff structure of the RMC for water services is given in Table D.1.

Table D.1 Structure of the water sector in Rajkot Municipal Corporation

[54] Under Section 63, it is the obligatory function of the corporation to make reasonable and adequate provision by any means or measures which it is lawfully competent for it to use or to take the management and maintenance of all municipal water works and the construction or acquisition of new works for a sufficient supply of water for public and private purposes.

Designation	Number
Municipal commissioner	1
Deputy municipal commissioner (technical)	1
City engineer / executive engineer	4
Deputy executive engineer	10
Assistant engineer / Additional assistant engineer	24
Valve operator	150
Filter Plant operators / Electrical staff etc.	150
Chief chemist / Chemist at filter plant	4
Water tax officers / tax staff / Administrative staff	20

Source RMC (2000)

Overview of water sector

The following section describes the sources of water supply, water treatment facilities, and the water distribution system in Rajkot. Table D.2 illustrates the growth in the water sector in Rajkot since the establishment of the RMC.

Table D.2 Comparative development of waterworks since the formation of Rajkot Municipal Corporation

Source	*1973*	*1999*
Existing	Aji I, Lalpari & Randarda	Aji I, Lalpari & Randarda, Nyari I, Bhadar, Aji III, Nyari II
Proposed	Nyari - I, Bhadar	Khokhaddadi , Machchhu II, Lapasari
Daily drawl	26.5 MLD[a]	95.3 MLD (gross)
Number of filter plants	Aji	Aji (2) Nyari (2) Ribda (2)
Number of tap connections	32 000	100 000

Source. RMC (2000)

[a]million litres per day

Water is currently supplied from reservoirs through pipelines. The water supply is usually about 92 MLD (million litres per day). However, in May 2000 drought in

Gujarat, this has decreased to about 77.5 MLD. Raiya, Nana-Mava, and Mavdi areas recently merged with the RMC do not have access to piped municipal water supply. Thus, about 70 square kilometre of the nearly 105 square kilometre of municipal limits are uncovered by municipal water supply. These areas are served by about 830 standposts and 250 tankers.

Rajkot has three filtration plants for water treatment at Ribda, Aji and Nyari. One more filter plant at Ghanteshwar is nearing completion. The details of the treatment capacity in the city are given in Table D.3.

Table D.3 Details of water treatment capacity in Rajkot Municipal Corporation

Treatment particulars	Yield (MLD)[a]
Design capacity	131.5
Utilised capacity	112.5
Water received from source	112.5
Water transmitted to reservoirs	112.5

Source RMC (2000)

[a]million litres per day

The water supply distribution network in is divided into four major zones, Jubilee, Gurukul, Nyari and Aji (Table D.4 and 5). The distribution network comprises of 900 mm pipes.

Table D.4 Water supply zones in Rajkot Municipal Corporation

Water supply zone	*Ground level service reservoir*	*Elevator storage reservoir*	*Ward covered*
Jubilee	2	2	1, 2, 3, 13, 15, 16
Gurukul	2	2	2, 4, 6, 7, 8, 9, 10, 21
Nyari	4	1	9, 10, 11, 12, 13, 14, 22, 23, 24
Aji	6	-	4, 5, 6, 17, 18, 19, 20

Source RMC (2000)

Table D.5 Distribution network in Rajkot Municipal Corporation

Main types	*Pipe material*	Main types	*Pipe material*
Trunk main		Transmission main	
750 mm	Prestress	863 mm	Mild

	ed		steel
600 mm	AC pressure	900 mm	Prestressed
450 mm	AC pressure	700 mm	Prestressed
750 mm	Hume steel	750 mm	Prestressed
450 mm	Cast iron	Feeder main	
Distribution main		400 mm	AC pressure
150 mm	AC pressure	300 mm	AC pressure
100 mm	AC pressure	250 mm	AC pressure
80 mm	AC pressure	200 mm	AC pressure
150 mm	Cast iron	150 mm	AC pressure
100 mm	Cast iron	450 mm	Cast iron
80 mm	Cast iron	300 mm	Cast iron
		250 mm	Cast iron
		200 mm	Cast iron
		150 mm	Cast Iron

Source RMC (2000)

Usually, water is supplied for half an hour daily and the average supply is about 110 LPCD (litres per capita per day). However, during the 1999/2000 drought, the supply fell to just 90 LPCD and water was being supplied only every alternate day.

Nearly all connections are un-metered (Table D.6). Nearly 30% of the connections are commercial consumers. There are no estimates of losses in the system due to leakages.

Table D.6 Number of water connections in Rajkot Municipal Corporation (by category)

Category	¾ inch	½ inch	¼ inch	Metered
Residential	100	101 336	722	60
Commercial	13	42 600	57	490
Total	113	143 936	779	550

Source RMC (2000)

Water demand

The GIDB (1999) has estimated the demand for water in Gujarat in its Gujarat Infrastructure Agenda: Vision 2010 document. Assuming an annual population growth

rate of 3.05% and the per capita water supply norm of 160 LPCD, the estimated demand was over 141 MLD. The demand estimated by the RMC is just over 110 MLD (Figure D.2).

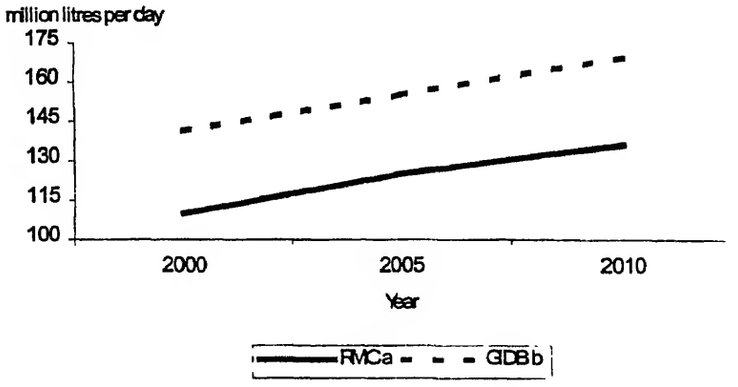


Figure D.2 Growth in water demand in Rajkot Municipal Corporation (million litres per day)

[a]Rajkot Municipal Corporation; [b] Gujarat Infrastructure Development Board

Source. GIDB (1999) and RMC (2000)

Taking the average supply Figure D. of 92 MLD, the shortfall in demand estimated by the GIDB (1999) is nearly 50 MLD. This is projected to grow to over 93 MLD by 2010 if supply is not augmented (Figure D.3). The gap in the region is about 10% of the total demand–supply gap in Gujarat even though it comprises less than 2% of the state's population.

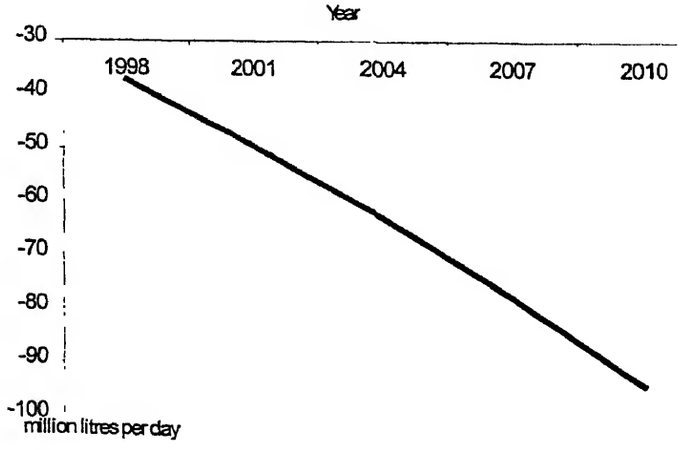


Figure D.3 Demand-supply gap (million litres per day)

Source GIDB (1999)

However, with the supply currently having fallen to less than 77 MLD, the present shortage in water supply is nearly 65 MLD.

The cost of augmenting supply has been estimated at over 8.5 billion rupees (Table D.7). Based on a norm of 7.9 million rupees per MLD. The investment for augmenting the distribution system is based on a norm of Rs 200 per capita. The estimates assume that no capacity addition takes place in the previous years.

Table D.7 Cumulative investment required for the water sector in Rajkot (Rs million)

Year	*Sourcing*	*Distribution*	*Total*
2001	390	3764	4154
2004	495	4988	5484
2007	610	6327	6938
2010	736	7793	8529

Source GIDB (1999)

As is the case with other Municipal Corporations in Gujarat, a significant proportion of the water supply is for domestic purposes (Table D.8). The RMC supplies water to domestic consumers through piped individual tap connections in older Rajkot, through tankers and standposts in the recently merged area, and through community standposts in slum areas (Table D.9).

Table D.8 Water distribution by consumer category

Category	*Proportion of water consumed (%)*
Domestic	85 (including standpost)
Commercial	12
Industrial	3

Source RMC (2000)

Table D.9 Number of connections in Rajkot Municipal Corporation (by type)

Item	Number
House connections	110 000
Standposts	2100
Hand Pumps (RMC)	1700

Source RMC (2000)

The RMC does not encourage industrial demand much due to lack of water resources. The industries generally prefer to purchase water from private tankers. The few industrial consumers have metered connections. Also, the industry is not water intensive in Rajkot. Thus the industrial water demand is low.

Plans for water sector development

The shortfall of water has been estimated at about 50 MLD. To meet this shortfall, the RMC would have to depend completely on surface water, as the region's rock-hard surface does not permit groundwater exploitation.

Source development

The following options are under the consideration of the RMC to augment water supply.

- *Increasing storage capacity of Nyari Dam* The Nyari I dam which has a capacity of 26476 million litres is located about 10 km from the city. The municipal corporation, proposes to increase the capacity of the dam by raising the earthen dam and widening the waster weir. This would increase the capacity to 40 068 million litres. The estimated cost of this project is 116.4 million rupees.
- *Construction of Lapasari check dam* If a small check dam is constructed on Bhakarwadi river near Lapasari village, 8 km away from the city, the water could be diverted to the Aji dam every monsoon, increasing the dam's capacity by at least 1415 million litres. The estimated cost of the project is 35 million rupees. The project is in the execution stage.
- *Provision for drinking water from the Mahi Canal* The RMC has submitted a proposal to the Government of Gujarat for making a provision for drinking water from the Mahi–Narmada canal. It will be possible to get nearly 84 MLD water through the scheme. The project is still at proposal stage.

Extension of distribution network

To provide piped potable water to about 200 000 people of Raiya and Nana-Mava area, the Nyari-II based drinking water supply project including the filtration plan, the distribution system, and the zonal reservoir was designed. The project with estimated

cost of 16.50 million rupees involved the laying of about 150 km of AC pressure pipes of 80–300 mm diameter. It is proposed that from 2001, about 25 000 house connections will be provided through this distribution system.

Complaint redressal in RMC

There is an elaborate compliant redressal mechanism in RMC. Complaints can be registered round the clock. However, complaints can be registered at a central control room only. The complainant has to fill and submit a three-part form. The information on the complaint is passed on to the field staff. Once the complaint has been attended to, two parts of the filled-up complaint form are sent to the field staff who are required to get these signed by the complainant and send back one part of the form to the head office.

Fiscal framework

As with all other municipal corporations in the state, the RMC's activities are guided by its budget. Under Section 95 (Chapter IX) of the BPMC Act, the municipal commissioner is required to prepare an estimate of the expenses in the next financial year, balances available, receipt of revenue, and proposals for taxation. This is presented to the Standing Committee, which reviews it and sends it to the corporation for approval and adoption.

From 1994/95 to 1999/2000 the RMC has earned a revenue surplus (Table D.10). However, in the current financial year (2000/2001), it is expected that the revenue expenditure would exceed the revenue income. This is primarily on account of a dramatic rise in debt servicing in the RMC.

Table D.10 Financial summary of the Rajkot Municipal Corporation budget (Rs million)

Account head	*1994/95*	*1995/96*	*1996/97*	*1997/98*	*1998/99*	*1999/2000*	*2000/2001*
Revenue income	444	578	666	737	827	961	1057
Revenue expenses	332	393	484	555	745	757	1198
Revenue surplus	112	185	182	182	83	204	!142

Source RMC (1999)

Two kinds of charges are collected from the water sector, namely water charge, piped water supply, and tanker charges for supplying water through tankers. Tankers are

used in the case of deficient water supply or to supply water to areas not covered by piped water supply. There has been no discernible trend in the collection of charges from the water sector. Since 1996/97, the collection of charges has averaged about 33 million rupees annually (Figure D.4).

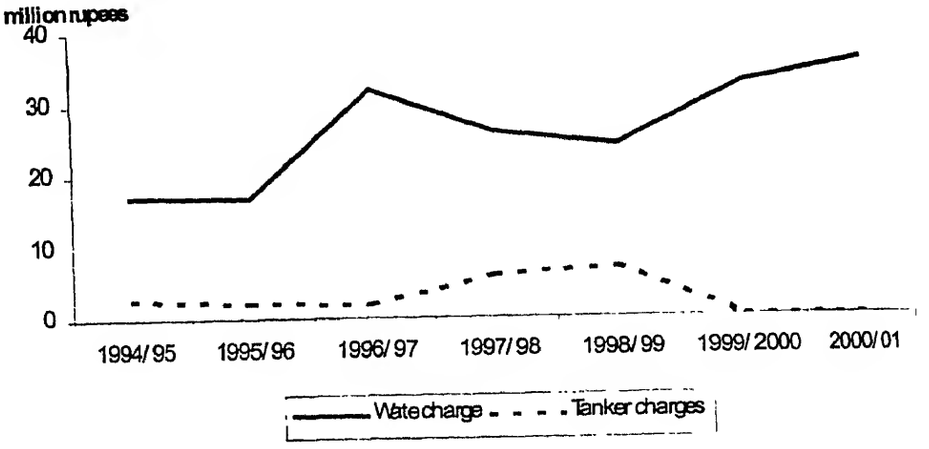


Figure D.4 Collection of charges from the water sector (Rs million)

Source RMC (2000)

Subsidy in the water sector

Table D.11 presents an analysis of the O&M (operating and maintenance) costs and the revenue from the water sector. Given the average supply of water of 92 MLD and assuming that water is available only 350 days a year, the O&M costs of water supply are about Rs 4.30 per 1000 litres. However, about Rs 1.00 per 1000 litres is collected. This analysis does not take into account capital cost, rate of interest thereon, and depreciation of machinery.

Table D.11 Subsidy in water supply

Total water supply O&M expenditure (Rupees thousand)	139
Total supply (million litres per day)	
Number of days a year water is supplied	

Cost of supplying water in (paise per litre)	
Total revenue from the water sector	32
Revenue from water (paise per litre)	

Source RMC (2000)

Since 1990, there has been no increase in the water charges. However, O&M costs have increased by about 105% since 1995. Per capita subsidy also rose by 115% (RMC 2000) over the same period.

Municipal taxation

Under the BPMC Act, the municipal commissioner is to propose taxes and charges and prepare an estimate of the revenue from the receipts of taxation. These are to be approved by the Municipal Board after being reviewed by the Standing Committee.

The municipal corporation can impose a water tax as a part of the property tax as per the provisions of the Chapter XI (Municipal Taxation) of the BPMC Act. Section 127(1)(a) enjoins upon the corporation to impose property tax. Under Section 129, the property tax consists of a water tax (Section 129[a]), a conservancy tax (Section 129[b]), and a general tax (Section 129[c]). Alternatively, as per the provisions of Section 134, the corporation can also levy a fixed charge ... in lieu of taxes for water supplied. Under this provision, the corporation can, instead of levying the water tax in respect of any premises liable thereto, charge for the water supplied to such premises by measurement at such rate as shall from time to time be prescribed by the said (Standing) Committee in this behalf or by the size of the water connection with the municipal main.... It is under this provision that RMC, instead of levying a water tax as a part of the property tax, levies a water charges, based on the size of the connection from the main. Under the

provisions of this section, the Corporation is free to prescribe any level of water charge it desires. Thus, the corporation is more or less independent in the setting of water tax rates under the present legal framework.

The corporation can levy water tax only on properties that draw water provided by it. However, there are certain areas in the city where the municipal commissioner has issued a public notice stating that the corporation has arranged to supply water through house connections, tankers, or public standposts. In these notified areas, called the water zones, the corporation can levy a water tax irrespective of whether the property is connected to a municipal water supply or not (Section 130). Similarly, only properties that are connected to the municipal mains are required to pay the water charge. Apart from the water tax, a water connection charge is also levied.

The current water charge structure is given in detail in Table D.12.

Table D.12 Monthly water charge in the Rajkot Municipal Corporation (rupees)

Size of connection (inch)	*Residential*	*Commercial/industrial*
3/8	16	32
½	20	40
¾	48	96
1	120	960
2	480	3840
3	1200	9600
4	1800	14400
6	2700	21600
8	3600	28800
12	4800	38400

Source RMC (2000)

As can be seen the water charge for commercial and industrial consumers is twice that of domestic consumers for connections less than an inch and eight times more for connections that are an inch or more. This implies there is significant cross-subsidization of domestic consumers by commercial and industrial consumers.

Under the new amendment of Gujarat Act No 3 of 1999, the calculation of property tax has been redefined under Section 141-B and the corporation has an option to calculate the property tax under Section 129 or under Section 141-B. Under the new formula, the rate of tax is determined taking into account the following parameters.

- The market value of the land in the area where the building is located
- The age of the building
- Type of usage of the building
- Whether the building has been tenanted or not

The property tax is calculated as follows using the new formula.

Property tax = Rate × Area × (F1 × F2 × F3 × F4)

where

F1 is the market value of the land in the area where the building is located

F2 is the age of the building

F3 is the type of usage

F4 relates to whether self occupied or not.

Thus the new property tax formula would not give any indication of the water consumption at all.

Private sector participation

As elsewhere, there is no evidence of any significant privatization initiative in the water sector in Gujarat. There has been some degree of private sector involvement in the water sector in the RMC. The RMC has privatized the maintenance of water distribution system, that is the pumping stations and the pipeline network. For this an annual maintenance contract is fixed with private contractors based on a bidding process. In this, the private contractors were asked to make arrangements for repair and maintenance of pipelines round the clock.

One of the reasons for not initiating private sector involvement in the RMC is the enormous gap in the demand and supply of water. It is argued that private operators would not involve themselves in this sector unless it is operated on commercial principles. Also, since water is such a scare resource in the region, and given the universal service obligation issues in the water sector, it would be difficult to ensure social acceptability and political will for commercializing this sector in the region. Nevertheless, given the criticality of the demand–supply gap in the area, and the consequent investment requirements, private sector involvement in this sector is an option that should be explored.

Conclusions

- As mentioned in the previous section, there is a considerable gap between the demand and supply of water, and this is projected to increase appreciably in the future if supply is not augmented. The investment required for this purpose has been estimated to be over 8.5 billion rupees. This would imply substantial involvement from the private sector.

- There is considerable subsidization of the water sector. The collection of charges from the water sector is not even enough to meet the O&M expenditure for water supply.
- There is significant cross-subsidization from the industrial and commercial consumers to the domestic consumers in the RMC.
- Private sector involvement in the water sector in Rajkot has been only in very discrete functions by way of service contracts.
- As is the case with Ahmedabad, the water charges are not linked to the total consumption.

E Case study of Tirupur

Introduction

Tirupur is located about 55 km east of Coimbatore in Tamil Nadu. Tirupur or the TM (Tirupur Municipality) area is the second largest town in Coimbatore district. The TM had a population of 235 661 as per the 1991 census and covers an area of 27 square kilometre. The TLPA (Tirupur local planning area) surrounding the town comprises TM, two town panchayats, and 14 village panchayats. The geographical area measures 217 square kilometre. The municipal administration is governed by the rules laid under the Tamil Nadu District Municipalities Act, 1920. The municipal council with its chairperson is elected by the people and is responsible for implementation of the various services within the TM such as piped water supply, sanitation, solid waste management, roads, etc.

The economy of the TLPA revolves around the cotton knitwear industry which started as a cottage industry in the early 1960s and is now India's leading knitwear export centre. It accounts for nearly 90% of India's knitwear exports, equivalent to approximately 1 billion dollars at current prices. This growth has been achieved through a dense and complex network of knitting and manufacturing units. Despite its unique position, the industry faces constraints in infrastructure. Water, an essential input to the bleaching and dyeing process, is in short supply.

Genesis of the Tirupur Area Development Programme

As mentioned earlier, the extraordinary export volume attained by the Tirupur cotton knitwear industry has been achieved despite severe infrastructure bottlenecks. Singular amongst these is the absence of water and related infrastructure for collection, treatment, and disposal of waste water. In addition, Tirupur lacks adequate roads, transhipment facilities, power, telecommunication, and urban infrastructure facilities.

Investments in infrastructure in the region have been significantly lagging demand. The continuing inability of the GoTN (Government of Tamil Nadu) and TM to make the necessary investments had prompted local industry represented by the TEA (Tirupur Exporters Association) to peruse alternate solutions. As a result of TEA representation to GoTN with regard to severe infrastructure bottlenecks in the region, the GoTN drafted out the TADP (Tirupur Area Development Programme). The TADP was envisaged as a development programme with the twin objective of meeting the infrastructure

requirements of the town and industry while at the same time restraining the environmental degradation within the region. While the proposed TADP covers a number of infrastructure areas, the first essentially relates to water supply, waste water, and industrial effluent treatment. This approach has been adopted to facilitate a focused approach, induction of strategic partners, project recourse funding, and timely execution of the various projects.

Recognizing the need to improve local infrastructure, GoTN and the TACID (Tamil Nadu Corporation of Industrial Infrastructure Development Limited) mandated IL&FS (Infrastructure Leasing & Financial Services Limited) in 1993 to identify the infrastructure requirements of Tirupur with the end objective of enhancing the export and industrial potential. After a detailed study IL&FS evolved an integrated area development programme for Tirupur comprising several projects. The principal project components were water supply, drainage and effluent treatment, road network improvements and expansion, telecom upgradation, and housing. The GoTN sanctioned its share in the investment in the form of equity. The project also enjoyed equity participation and support of the Government of India which approved the investment of 100 million rupees as their contribution for the project.

IL&FS also recommended that a 'special purpose vehicle' be set up to implement the project on a commercial basis. Subsequently, a public limited company, the NTADCL (New Tirupur Area Development Corporation Limited), was promoted jointly by TACID, TEA, and IL&FS to execute the TADP.

The NTADCL is implementing the project on a BOOT (build-own-operate-transfer basis). The BOOT structure envisages selection of an operator for the design and construction of the project facilities and their operation and maintenance over the concession period. Ownership of the project assets shall lie exclusively with the NTADCL in its capacity as the concessionaire.

Existing service levels

Presently, the TM provides water, through the municipal system, for domestic consumption for two hours every alternate day. The water requirements for industry are met entirely through groundwater abstraction transported over long distances by private water tankers. The municipality does not have a sewage collection, treatment, and disposal facility. Approximately 65% of all domestic establishments in the municipality have septic tanks with overflows being discharged directly on the street. Until recently, industries have also been discharging effluent without treatment. The resultant environmental degradation in the TLPA has been severe.

With the growth of the local knitwear industry, the abstraction of groundwater has progressively expanded to cover a radius of between 20 and 30 km. As a result, local

landowners have shifted from farming to servicing the water requirements of the industry. The unregulated abstraction of groundwater has led to dangerous depletion in groundwater reserves. It has been estimated that existing reserves would reach saturation levels over the next three years. Thereafter, this source of water would be unavailable to sustain industrial activity.

The discharge of untreated effluents has resulted in the severe contamination of the groundwater acquifers. Public health concerns have become significant as most households also resort to groundwater tapping to meet their daily water requirements. The poor quality of water has prompted the industry to make increasing levels of investment to treat pre-production water.

In the light of specific interventions requested by local people affected by the pollution caused by industry, the Green Bench of the Madras High Court directed the TNPCB (Tamil Nadu Pollution Control Board) to take closure action against all those units which did not comply with the TNPCB's environmental standards. Approximately 150 units have been closed for non-compliance, while the balance units have initiated steps to meet the TNPCB standards. The physical progress is being closely monitored by the TNPCB with periodic reports being tabled for the record of the Green Bench.

The implementation of effluent treatment schemes would progressively address some of the issues relating to the degradation of the environment. However, the poor quality of water and severe depletion of groundwater resources remains a big concern. Thus the sustainable long-term solution is the provision of treated water supply scheme to industries which substitutes groundwater abstraction for this purpose.

Demand for services

A consortium of independent consultants comprising Kirloskar Consultants, Operations Research Group, and Mahindra Acres Consulting Engineers have carried out a detailed analysis of the demand for the services from the project. The consultants have analysed the demand based on interactions with all the industrial units and on usage patterns. The household demand has been estimated based on analysis of the existing service levels and projected population in the service area.

Domestic demand

The consortium used the estimated growth in population, the required service levels and the existing alternate supplies for estimating the domestic demand for both the TM are and wayside villages. The service levels also factor into account the living standards within the TM area and outside. The demand estimates, net of existing available supply, are summarized in Figure E.1.

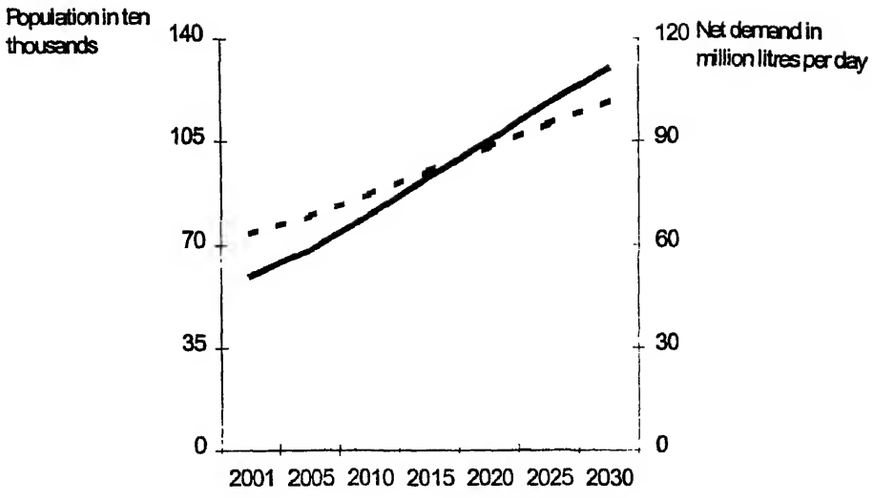


Figure E.1 Demand for water for domestic use in Tirupur

Source IL&FS (1999)

Industrial demand

The future demand is forecast based on the trend in volume of textile products exported from Tirupur. An analysis of 13 year data indicates a likely growth of textile production volumes by 10% to 15% per annum. The consultants, on a conservative basis, have assumed the demand to stabilize at a level of 3% per annum after year 2002. The demand has been estimated for three growth scenarios of low, medium and high growth rates, as well as assuming shift in technology. The projected demand is given in Table E.1.

Table E.1 Industrial demand for water (million litres per day) in Tirupur

	Low growth rate (8%)		Moderate growth rate (10%)		High growth rate (15%)	
Year	*Normal*	*Technology shift*	*Normal*	*Technology shift*	*Normal*	*Technology shift*
Current	93.20	93.20	93.20	93.20	93.20	93.20
1999	100.66	97.64	102.52	99.45	107.16	103.97
2000	108.71	103.28	112.78	107.14	123.26	117.10
2001	117.41	109.19	124.06	115.37	141.75	131.83
2001	126.80	115.39	136.46	124.18	163.02	148.34
2015	186.22	167.59	200.40	180.36	239.39	215.45

Source IL&FS (1999)

Thus, even in the most conservative scenario, the industrial demand is expected to be 115 mld (million litres per day) by 2002.

Project description

The project is an integrated water sector programme and envisages the following activities.

- Establishment of bulk water supply system, including laying down of the pipeline network for transmission, for abstraction and treatment of 185 mld of raw water from river Cauveri, and distribution to bulk industrial consumers (approximately 550 in number), TM, and four villages enroute.
- A water distribution system to store and distribute treated water to domestic and industrial consumers within TM's jurisdiction.
- A sewage collection, treatment, and disposal system for the TM, including on-site sanitation facilities (for the slum areas).

The project envisages a two-phase construction with a three year first phase aggregate cost of 12.07 billion rupees to service industrial, commercial, and domestic consumers located in the TLPA. In addition water supply is proposed to be provided for four wayside unions and a model township, which lie enroute on the water transmission corridor.

The GoTN has approved and allocated the right to abstract 185 mld of raw water from the river Cauveri, approximately 1 percent of the total Cauvery water available to Tamil Nadu for allocation. The abstraction point is located approximately 55 km from Tirupur and about 1 km downstream of the confluence of river Bhavani (a tributary of Cauveri) and the river Cauveri. The Water Allocation Board of the GoTN has stipulated the sharing of the 185 mld between industries and households in a 100 mld: 85 mld ratio. The project design reflects the allocation scheme of the board.

The design of water treatment processes has been based on the existing raw water quality data of river Cauveri. Water is to be supplied to all consumers after treatment to potable standards as specified in the manual on Water Supply and Treatment, published by the CPHEEO (Central Public Health and Environmental Engineering Organization).

Project characteristics

This project is a unique public–private partnership and aims to be a catalyst to significant socio-economic benefits for the region.

Sponsors

The institutions involved in the project as either investors or lenders are listed below.

- Government of India
- Government of Tamil Nadu
- Tirupur Exporters Association
- Infrastructure Leasing & Financial Services Limited
- The World Bank
- USAID (United States Agency for International Development)

Several experts have been drawn on to provide necessary inputs on various aspects of the project along with an active support of the World Bank throughout the development phase.

Contractual framework

A concession has been granted to the project company allowing for exclusive rights for the provision of water supply and waste water treatment in the region.
The project seeks to replace existing water supply sources and hence does not require huge incremental demand for viability.

A credible contractual framework has been established allocating roles and responsibilities of and rights and obligations of the project's various stakeholders. The construction contractors would have to commit to a lump sum, fixed-time / fixed-price / turnkey contracts with compensation for delays.

A CA (concession agreement) grants NTADCL an exclusive franchise to provide the services delineated earlier. The GoTN through the CA has agreed to introduce appropriate legislation, which would prohibit the extraction of groundwater for non-domestic use in the TLPA for a minimum of 15 years from the commencement of services by NTADCL. Further, NTADCL would be given the right of first refusal for provision of like services within the TLPA.

Rate of return

The NTADCL would be allowed to levy a composite water charge to supply to industrial units and on a bulk basis to TM and Tamil Nadu Water Supply and Drainage Board for wayside villages. The charge is set to recover a fixed rate of return on total investment over the concession period, initially set at 30 years. The concession assures a post tax rate of return of 20% on investment and would be terminated whenever the target rate of return is achieved. Project lenders are offered prudent allocation of risks and a security package including but not limited to project receivables, pledge of project assets and contracts, debt service reserve fund, commitment of contracted sponsor equity to the project.

Potential to earn additional investment through development of value-added franchisees to develop ancillary infrastructure like fibre optic network, power cable network, gas pipelines, bottled water, waste water recycling, etc. through affiliates / subsidiaries is also a possibility. Also, there is a provision in the CA to generate additional revenues through real estate development.

Socio-economic impacts

The project has been designed to provide competitive service tariffs for the consumer, and more importantly, allowing access to water and sewage treatment to the residential customers and preserving the competitive position of Tirupur's industry. It would also significantly improve the environment in the region by reducing the pollution and improving the groundwater resources.

Strategy for execution

The IL&FS has also been asked to undertake the role of merchant banker to the project and would be responsible for raising the requisite resources. IL&FS has obtained the sanction of USAID to this programme, thus enabling the raising of bonds aggregating to 25 million dollars from the US capital markets. The bonds have a 30 year tenure and are guaranteed by the US Government. NTADCL would also access ADB (Asian Development Bank) and the World Bank for debt mobilization.

The framework for implementation revolves around the contractual arrangement between NTADCL and each stakeholder and beneficiary. In all cases, the objective is to sub-contract the responsibility of NTADCL to appropriate experts with pass through penalties and benefits to the GoTN and TM and the contracted partly. The project development and implementation has been split up into multiple activities with an attempt to assign each activity to various agencies as depicted in Table E.2.

Table E.2 Allocation of responsibility

Activity	Agency responsible
Land acquisition and transfer free of encumbrances	GoTN (Government of Tamil Nadu) / TM (Tirupur Municipality)
Water source risk	GoTN
Design, engineering and construction	EPC Consortia
Operation and maintenance of water/wastewater system within TM	TM
Billing and collection within TM	TM
Operation, billing and maintenance outside TM	Operator
Collection outside TM (including wayside villages)	Operator (risk on NTADCL)
Financial arranger	IL&FS (Infrastructure Leasing and Financial Services
Oversight of project and acceptance of unallocable risks	IL&FS

The strategy adopted for the project execution is detailed in the following sub sections.

Memorandum of understanding

The GoTN and TEA approached IL&FS to examine the feasibility of implementing the project on a commercial basis. Based on an examination of the proposal, the project was judged to be commercially viable. Thereafter, through an MoU (memorandum of understanding), it was agreed that GoTN, TM, TEA, and IL&FS would jointly develop the project. The responsibility for achieving financial close vests with IL&FS.

Special purpose vehicle

In order to implement the project, a 'special purpose vehicle', the NTADCL was incorporated. The board of directors of the NTADCL comprised representatives of each of the initial shareholders and provided a formal platform for implementing the project on a public–private partnership basis. The NTADCL has a full time managing director supported by a team of experienced personnel. A committee of experts comprising water sector specialists was also constituted to assist and advice the board during the project documentation and bidding stages.

Provision for investment leveraging

The key driver for the project is provision for water and waste water infrastructure. However, as a corporate objective of area development, the business of NTADCL will

be further expanded by development of various value-added franchises that may be developed through affiliates or joint ventures. Given direct access to the households and industrial units, the additional infrastructure that may be developed with relative ease would include fibre optic network to provide a platform for telecom services, underground power cable network, gas supply network, as well as use the surplus water for establishing a bottled water supply. Additionally, it is expected that the industrial demand would outgrow supply in the initial years. Hence, investment in a waste water recycling facility is proposed, which would enable NTADCL to supply additional water to the industry and thereby generate additional revenues.

Involvement of stakeholders

The project has been developed through the framework of NTADCL with the board of directors as the oversight authority. In addition, wherever appropriate, approval of individual sponsor agencies was taken prior to implementation. As a result, the project has been developed on a transparent basis, with decisions reflective of stakeholder interest and concerns. Some of the key stakeholders are discussed below.

Private sector consortium

The project, as developed and approved by the NTADCL, TEA, GoTN, and TM, was bid on an internationally competitive bidding basis to induct an experienced and suitably qualified consortium to build, operate, and maintain the facility for the period of the concession. On this basis, the private sector consortium, comprising Mahindra and Mahindra, Bechtel and United Utilities was selected. In addition, Mahindra and Mahindra and Bechtel inducted Larsen and Toubro and Hindustan Construction Company as their partners for the purposes of implementing the respective construction contracts.

Atlantis Water Fund

An MoU was signed with Atlantis Water Fund of the USA to participate in the project as an initial sponsor and invest 26% of project equity. Atlantis is presently carrying out the due-diligence on the project.

NTADCL

As the concessionaire, NTADCL's responsibility extends from ensuring project design to financing, constructing, operating and maintaining the project, including billing and collecting from TM and industry and panchayats outside TM throughout the concession period. At the end of the concession period, NTADCL would hand over the facilities to the GoTN, in good working order and free of cost.

Time frame of implementation

The project would be implemented in two phases over a six-year period. Phase I would be completed in the first three years and would include the water supply, on-site sanitation for slums and select components of the sewerage scheme. Phase II represents the balance sewerage scheme to be implemented within the next three years. The implementation plan has been designed to optimize the capital investment programme while at the same time achieving the desired service levels of the programme.

Regulatory framework

The regulatory framework in the Tirupur project is divided into two separate components. These are presented in detail below.

Regulation of tariff

The CA provides an option to the concessionaire to charge separately for water supply and sewage disposal facilities. NTADCL initially proposed to levy a combined charge based on volume of water offtake. The CA also provides the users to pay a connection fee and security deposit (three months for industrial users, one month for others). The formula for tariff determination is spelt out calculated on pre-defined formulas based on inflation indices. The initial charges have been fixed, based on the requirement of achieving a commercial rate of return and willingness to pay of the purchasers.

Additionally, a Charges Review Committee has been constituted to regulate periodic changes in the tariff structure and for contingencies that may arise beyond the control of the concessionaire. This committee is required to be constituted by NTADCL under the terms of the CA. Approval of the committee would be required for any revision in water charges as proposed by NTADCL. The committee comprises representatives from the concessionaire and the state government, to be presided over by an independent judge.

Curiously, the Charges Review Committee would be appointed by NTADCL. Thus under the present arrangement, the concessionaire is required to appoint the regulator. Quite obviously, there could be conflict of interest for the committee in this case.

Regulation of service standards

In order to ensure compliance of the CA, GoTN, TM, and NTADCL are required to appoint reputed agencies with relevant track record as the IA (independent auditors) and IE (independent engineer) to undertake a process of periodic technical and financial reviews and certification and to regulate the terms of the CA. The functions of each of these are discussed in detail below.

Independent Engineer

An IE will be appointed for exercising the following regulatory powers.

- Determine and ensure compliance with the technical requirements, the performance standards, and costs of construction.
- Inspect the sites, sludge disposal sites, and the site for the system in order to determine the progress of construction, and operation and maintenance of the facilities and the extent of compliance with the technical requirements and the performance standards stipulated.
- Monitor on behalf of GoTN and TM the design, construction, operation and maintenance of the facilities and the extent of compliance with the technical requirements and the performance standards stipulated for the facilities and the extent of compliance by NTADCL of its obligations.
- Issue and sign the construction completion certificate for each part of the works upon achievement of the tests on completion as set out in the construction contracts and the final construction completion certificate upon completion of the project.
- Monitor the operation and maintenance of the facilities to ensure that the performance standards are adhered to.
- Establish the methodology of computation of transmission losses after due consultation with the parties to this agreement.
- Monitor the transfer of the facilities including but not limited to the testing and inspections following the transfer, and ensure that the facilities are transferred to the GoTN in line with the performance standards.
- Certify completion of interconnection facilities.
- Verify the cost of construction of the project as determined and submitted by NTADCL which shall be presented to GoTN, TM, and lenders.

Independent Auditor

An IA will be appointed for exercising the following regulatory powers.

- Verify and issue a certificate at the end of each financial year, confirming the accuracy of all calculations made during the relevant financial year.
- Certify the accuracy of the landed cost submitted in consultation with the IE.
- Audit and verify the total cost of project determined by NTADCL.
- In the event NTADCL is unable to recover the total cost of project as determined under the concession period, the IA shall submit a report to that effect to GoTN and NTADCL certifying the amount of shortfall.
- Furnish data to the Prices Review Committee at the request of NTADCL or as requested by the Prices Review Committee from time to time.

- Monitor the special purpose bank account opened by NTADCL in relation to the development income, and provide a report on the stock of lands sold or otherwise alienated vis-à-vis stock of land continuing in the hands of NTADCL, every six months to GoTN and TM. The said report shall further confirm whether all funds within the special purpose bank account have been used for the purposes of the project or not.

Again, the IA and IE would be appointed and paid for by NTADCL. As a result, regulatory functions are discharged by entities commissioned by the concessionaire. Thus regulatory independence is not guaranteed under the present arrangement.

Lessons for Gujarat

- Detailed feasibility studies by competent agencies are key to the success of any project. This would include preparing comprehensive financial and regulatory frameworks for the execution of the project.
- Initiatives like the Tirupur project that have been developed with substantive public–private partnerships are important to ensure that public interests are met along with ensuring the commercial viability of the sector.
- It is essential to have a well defined and definitive contract for any long-term private sector involvement in this sector so as to ensure that the private operator has confidence in the liberalization process. At the same time, it is important to provide flexibility in the regulatory mechanism to account for unforeseen events.
- An adequate rate of return for private investment needs to be assured for initiating private sector participation in this sector.
- Stakeholder involvement is necessary for the success of any such project. This would require that a mechanism for constant interaction with the stakeholders is established.

F Argentina: case study on private sector participation and regulatory framework

Introduction

Till recently, water industry in Argentina was managed by public companies. The first two, potable water and sewerage concessions in Argentina are being implemented in the provinces of Corrientes and the Greater Buenos Aires region in 1992. Buenos Aires is situated on the west bank of the Rio de Plata, which meets more than 90% of the city demand. Before this, the water supply and sewerage coverage in these two urban areas was only 59% and 36% respectively (World Bank 2000).

Till the early 1990s, water services were provided by the public utility called OSN (Obras Sanitarias de La Nation). The performance of the OSN was not satisfactory (Table F.1). Most of its water and sanitation system was very old and in need of immediate repair and replacement. The deterioration of the system often caused water shortages, frequent breaks and interruptions in supply, low pressure, poor water quality, and sewer flooding during rain storms. More than 40% of the water was unaccounted for. The public utility was not financially sound because of low level of water tariff, which declined over the years falling by almost 70% from 1960 to 1976. Consumers had little incentive to conserve water because of the low price for the water consumed, consumption was not metered, and billing was based on factors not relating to consumption. In addition, the law did not permit the OSN to disconnect service to defaulter households. In 1992, over 80% of those not connected to the sewerage system in Buenos Aires used septic tanks /cess pools, and the remaining resorted to direct disposal. Since many people not connected to the piped water supply system were depended on shallow tubewells, waterborne diseases were prevalent.

Table F.1 Performance indicators of the Obras Sanitarias de La Nation: 1985

Indicators	Federal capital	13 districts	Total
Population with water service (million)	2.9	2.6	5.5
Population with sewerage service (million)	2.9	1.7	4.6

Water production	3 578 000 cubic metres per day
Water connections	1 002 176
Water meters	148 354
Sewer connections	665 347
Treatment	97 080 cubic metres per day
Employees	9600 (average age: 52)
Average consumption per person/day	600 litres (36 cubic metres per person every two months)
Age of the water system	In the federal capital 83% over 40 years and 55% over 60 years
Average delay for repair or handling leaks	1 month in the federal capital and 2 months in Greater Buenos Aires

Source IADB (1999)

Private sector participation

Private sector participation was introduced to reduce fiscal burden and improve efficiency and quality of water provision and sewerage services. The government preferred a 30-year water concession to a management contract or lease, as it wanted the investor to take responsibility for new investments. The government decided against selling water assets as it feared that collecting requisite information on valuation of water assets would be time-consuming. The bid was competitive, and five consortia were prequalified. Aguas Argentinas, headed by Lyonnaise de Eaux – Dumez, which offered to reduce water tariff by 26.9% was selected as a concessionaire. Its share in the consortia is 50.4%, other shares are held by local investors (39.6%) and company employees (10%). The private operator is responsible for planning and financing new investment, supervising new works including design and construction, various service provisions like concession, O&M (operation and maintenance) of installation, renewal

of equipment, billing and collection, and control of water quality. Any investment beyond 10 million dollars has to be procured through international competitive bidding. Under the contract, the government retained asset ownership as well as the charge of sectoral policies, management of water resources, and of defining legal and regulatory framework.

The concession agreement laid down a set of targets for population coverage, sewerage treatment, network renovation, and unaccounted for water during the entire concession period (Table F.2).

Table F.2 Performance targets in the Buenos Aires concession contract (percentages)

Year of concession	Population coverage		Sewerage treatment		Network renovation (cumulative)		UFW[a]
	Water	Sewerage	Primary	Secondary	Water	Sewerage	
0	70	58	4	4	0	0	45
5	81	64	64	7	9	2	37
10	90	73	73	14	12	3	34
20	97	82	88	88	28	4	28
30	100	90	93	93	45	5	25

[a]unaccounted for water

Source World Bank (2000b)

In addition, the contract provided certain goals for meeting service quality and metering connection to city population. The company is required to invest around 4 billion dollars for the first 15 years of the concession period. There are penalties for non-performance and incentives for expansion of services, and reduction of the unaccounted for water and wasteful consumption of water.

Under the concession agreement, the company (Aguas Argentinas) maintained a monopoly over its service area because all the customers would require a connection, and therefore, any alternative source would have to be blocked (or made unusable). The government has also the power to charge taxes.

The agreement also required that all non-residential customers have meters while it is optional for residential customers. About one percent of the residential connections were metered at the time of concession.

The concession agreement mandates that residential customers, who are without meters at the time of concession, should get meters at the discretion of the concessionaire or at the user request.[55] The customer can exercise his choice only once. Since the users did not know the implication of their switchover to the metering system, very few customers opted for the metering system. Secondly, there is a provision that the residential users may only change their minds once if, as a result of metering, the cost of the service changes by 20%. The company in this eventuality should compensate users if it wants to meter the water service. The compensation includes the cost of replacing and installation of meter. Cross-subsidies between various consumers are allowed under the concession agreement.

[55] In this case, the user should pay for the meter and its installation cost.

Regulatory framework

Since 1993, ETOSS (Ente Tripartite de Obras de Servicios de Saneamiento), as independent regulator, has been monitoring the concession agreement granted to Aguas Argentinas. Its other functions include

- determination of tariff
- approval, and monitoring the company's five year investment plans
- hearing and investigation of complaints by consumers and others
- imposition of penalties when it finds that company is not complying with its regulation.

ETOSS is governed by a six member board: two representatives from the presidency, two from the provinces of Buenos Aires, and two from the municipality of Buenos Aires. Directors are appointed for six years with the possibility of reappointment. Members are appointed by the executive in each of the above jurisdictions and congress has no say in this regard. They can be removed from office only for a cause. In practice, most directors were not in office for more than two years. (The different levels of government represented on ETOSS have pressurized the regulator to make politically motivated decisions.)

In the event of a conflict between the regulator and company, the latter can appeal to the judiciary.

ETOSS is financed by all the company-invoiced customers who are charged a nominal fixed sum. It receives funding in proportion to the revenue of the regulated entity, which equals 2.67% of billing. Thus, the financial fortune of the regulator is dependent on the fortunes of the concessionaire. This arrangement affected the regulator's objectivity and effectiveness. It also did not preclude its 'capture' by the regulated company. The fines levied on the company's wrong- doing should be set aside for giving rebate to the customer on the first bill of the year (during 1994/95, the fine amounted to 46 400 dollars).

There is no provision for public hearing to resolve conflicts or address regulatory decisions.

The regulator's decisions are subjected to audit by the Judge Advocates Office of the nation but there is no open hearing system for resolving conflicts.

Water tariff

The concession agreement provided a complex formula for determining water and sewerage tariff. Prior to the concession agreement, water consumers paid charges at a

flat rate. Now, unmetered tariff is set by taking into account the existing flat rate for different types of consumers (e.g. residential) and services (water only or water and sewerage), and multiplying the same by a factor *K*. Immediately after concession, the *K* factor was pegged at 0.731.

The rate-setting system for potable water in Buenos Aires is based on property's area, its location, and its age. Charges are completely unrelated to the volume of water consumed.

Water rates are broadly divided into two categories – residential and commercial or industrial. Each can be either unmetered (the main category in terms of both physical volume and revenue) or metered service. The basic formula (Savedoff et al. 1999) for the unmetered service rate (P) is

$$P = T \times K \times Z\ (Sc \times E + S/10)$$

where, T is basic or general rate, K the adjustment coefficient, Z is a zone coefficient that discriminates by district, Sc the surface covered by the property, E coefficient of the dwelling quality which depends on the age and type or category of building, and S is a total property surface (whether covered or not). The P rate can differ according to class of users, zone classification, variations in the E coefficient or changes in the declaration of cubic metres of a particular property that are covered and not covered.

In contrast, Aguas Argentinas has a metred rate (PM) that is defined as one-half of the unmetered rate plus a variable rate that depends on the amount used above a pre-established consumption level:

$$PM = P/2 + K\,pm \times (X - Xb)$$

where PM is the price per cubic meter applied when consumption X exceeds basic consumption, Xb. The average rate then turns out to be a three-part rate: a fixed charge, P/2; a block of free consumption up to Xb, where the marginal price equals zero (Xb = 15 cubic metres per month) and the average price is declining; and a block where the marginal price equals PM and the average price is rising or falling depending on the system design. The price, PM, the fixed charge, and the unmetered rate are doubled if the users get sewerage as well as water supply services.

During the first revision of tariff (1994), the K factor was increased by 13.5%. Connection charges increased by 84%, and water infrastructure fee (applicable to new customers) by 38%. Later on, there was some downward revision of water tariff and connection charges. Notwithstanding such reduction, infrastructure fee (Table F.3) coupled with the connection fee created problems to many poor consumers; it led to protest resulting in renegotiation of concession contract in 1997.

Table F.3 Access charges in 1995 (dollars)

Head	Minim	Maximum

	um	
Water		
Connection fee	208	297
Infrastructure charge	43	340
Total water access charge	251	637
Sewerage		
Connection fee	284	319
Infrastructure charge	572	572
Total water access charge	856	891
Total access charge	1107	1528

Source World Bank (2000b)

There can be 'ordinary' and 'extraordinary' revisions of the price; ordinary revisions are meant to take care of the need for enforcement of the contract for addressing the issue on expansion plans or improvements according to five-year plans, while extraordinary revision takes care of rate changes that would arise from modification of the costs incurred by the company by more or less than seven percent or changes in the expansion plans, quality requirements, exchange rate, and taxes. There is a provision that the company has to go through a competitive bidding process if the cost of investment exceeds a sum of 10 million dollars.

In February 1997, the company argued for shortfall of its revenue, about 80% of which was allegedly beyond its control. It also requested for suspension of fines imposed by ETOSS because of delays in meeting various targets. The contract renegotiation took place with direct intervention of government – it resulted in changes (e.g. withdrawal of infrastructure charges) in terms and conditions of contract, especially the target schedule, tariff structure, etc. (Table F.4).

Table F.4 Comparison of average bimonthly charges (Before and after contract renegotiation[a])

Average charges for already connected residential customers	Before	After
Water and sewerage services	30.00	30.00
Regulatory fee (2.67%)	0.80	0.80
SUMA (Universal Service and Environmental Implement fee) charge	-	6.00
VAT (value added tax) (21%)	5.46	7.72
Total	36.26	44.52
Average charge for a new customer (water only)		
Water services	6.00	6.00
Regulatory fee (2.67%)	0.16	0.16
SUMA charge	-	3.00
CIS (connection charge)	-	4.00
Infrastructure charge	44.00[b]	-
VAT (21%)	10.53	2.76
Total	60.69	15.92

[a]In Argentina Pesos (equivalent to US$)

[b]Average monthly payment for the first two years

Source World Bank (2000b)

Quality standards

The concession contract defines a set of water quality parameters. Effluent quality parameters are set for waste water undergoing primary and secondary treatment. Standards were also specified for improved coverage. Service quality improved remarkably after the concession (Table F.5). Water pressure improved and response time to complaints reduced, although the number of complaints registered increased due to improvement of the communication channel.

Table F.5 Service indicators

	Before concession (1992)	After concession (1995)
Water complaints (no.)	43800	143739
Response time (hr.)	144	48
Sewerage complaints (no.)	99400	164922
Response time (hr.)	240	30
Customers with pressure >8wcm[a] (%)	17%[b]	54%[c]
Greater Buenos Aires[b]		

[a] wcm = water column metres where 10 wcm = 1 atmosphere; [b] May 1993; [c] April 1996
Source World Bank (2000b)

Performance indicator trends

During the contract period, performance indicators are moving in a positive direction (Table F.6).

Table F.6 Trends in Aguas Argentinas: financial indicators (in millions of dollars)

Increased population served with water	84 400 inhabitants (115% of goals, as reported by the company)
Increased population served with sewers	386 000 inhabitants (340% of goals, as reported by the company)
Repair of water pipe system	634 km (155% of goals)
Water not accounted for	31% (goal for year 15 attained) initially (in the speculations) the loss was 43%
Meter installation	92 500 (116% of goals, according to ETOSS Ruling No. 66/95)
Increase in productive capacity	37 % (24%due to the rehabilitation of pre-existing plants)
Water pressure in the federal capital	
Percentage of connectors with over 8 meters pressure	From 15% (year 1) to 97% (year 3)
Percentage with pressure under 2 meters	From 2% (year 1) to 0% (year 3)
Water pressure in Greater Buenos Aires	
Percentage of connections with over 8 meters pressure	From 13% (year 1) to 54% (year 3)
Percentage with pressure under 2 meters	From 4% (year 1) to 1.7% (year 3)
Hours of delay in resolving water complaints	From 70 in 1993 to 50 in 1995
Hours of delay in resolving sewerage complaints	From 70 in 1993 to 25 in 1995
Collection within 6 months	Rose from 86% at the beginning, to 89% by the end of the third year
Investment	$625 million ($145 in year 1, $127 for upgrading the company; $210 in year 2; and $270 in year 3, $157 in expansion, $50 in rehabilitation of existing assets and $64 in upgrading the company)

Staff	Initially 7365; first year 3800; since then, growing at 2%/year

Source IADB (1999)

Lessons from Argentina's experience

The following are the lessons from the Argentinian concession agreement.

- Contract should indicate clear risks and responsibilities of the private partner.
- The regulator should have its own fund, and its fund should not depend on the revenue of the regulated entity.
- Regulator should not be loaded with partisan officials. Executive branch should not interfere with the regulatory process.
- Decision-making should be transparent and rule based.

G Bolivia: case study on private sector participation and regulatory framework

Introduction

In Bolivia, the municipalities and their public utilities were till recently responsible for the provision of water and sewerage services in various urban areas such as La Paz and El Alto. Prior to 1997, the coverage of piped water supply was about 83% in El Alto and 93% in La Paz. The sewerage connections were extended to 32%–45% of the population in El Alto, while it is 66% in La Paz.

A municipality-owned public utility called SAMAPA (Servicio Autonomo Municipal da Agua Potable y Alcantarillado) used to provide water and sanitation services in El Alto and La Paz. The board of SAMAPA, chaired by the mayor of La Paz, was responsible for these services under the supervision of the national government.

Regulatory framework

Since 1990, the Government of Bolivia has enacted several regulations for increasing the coverage of water and sewerage services in urban areas. The basic principles of these regulations were to universalize access to various water and sanitation services, promote efficiency in the use of water resources, and protect the environment (Law number 1600 of October 1994) The law divided urban areas into two categories: concessionable zones and non-concessionable zones. In the concessional zone, responsibility for such services is with the EPSA (defined as legal, public, or private person that provides water and sanitation services, and could take any form such as private business, other than municipal governments), while in the non-concessional zones, the municipality as well as EPSA could provide such services. Thus, the law assures that the private companies could participate in the provision of various services in urban areas. This has to be undertaken through concession according to regulation set by the regulator. Article 35 of the National Regulation of 1994 outlines the features of concession contract which include

- objectives and time limit for concession
- limiting the area of concession
- rights and obligations of the concession holder
- programmes for investments and their execution
- guarantees for contract fulfilment
- effects of declaration for revocation
- conditions for modification of contract
- sanctions
- technical conditions and quality of supply
- parameters for continuity of service
- stipulations to protect and conserve the environment.

Article 44 further stipulates the procedure to offer licences to EPSA or the municipal government for provision of water and sewerage services in non-concessionable zones. The licences may be granted, by the regulator. The licence, however, did not confer any exclusivity rights to the municipal governments or the EPSA in those areas.

Although in 1992, the Ministry of Urban Affairs, developed a National Regulation which defined in-house water and sewer service as the only acceptable long-term water and sanitation solution to urban areas, the regulation was hardly enforced. Thereafter, in 1994, the government decided to create an 'independent national regulator' called the Superintendencia de Aguas in the water sector. Its responsibilities are to

- offer concessions and licences for potable water and sanitation services
- declare and arrange revocation of concessions
- monitor fulfilment of obligations and rights of concessions
- approve goals of quality, expansion, and development of EPSA consistent with the national plan
- recommend rates that municipal governments should collect for provision of services of potable water and to forward such recommendations to the government
- determine the rights of the users of services of potable water and sanitation services
- assure that the services provided are of adequate quality
- maintain a commercial, financial, and technical system of information as regards concession and licence matters
- approve and verify the application of prices and tariff ceiling and publish the same for wider information
- apply sanctions in the case of violations in the terms of concessions.

Private sector participation

In July 1997, the regulator approved a concession contract with Aguas del Illimani under which the latter undertook the responsibility of providing water and sanitation

services in the La-Paz-El Alto metropolitan area. SAMAPA, continues to exist as a legal entity whose activity is limited to administering the assets-leasing contract with the company. The concession contract was subject to strict performance standards such as (a) output standards (e.g. type of service, service quality, source reliability, and customer service), b) input standards (e.g. materials and design standards) which are subject to approval by the regulator, and (c) expansion mandates.

The expansion mandates (Table G.1) included connection requirements, target coverage (percentage), and the requirements to connect households meeting certain criteria. The percentage coverage expansion mandates are dependant on the regulatory decisions, as the contract calls for the regulator to use population projection for translating the coverage targets for each five year period into specific connection requirements. Further, the expansion mandate, which should be based on certain criteria, became a source of dispute, as the contract did not set any deadlines for completing the expansions.

Table G.1 Water and sewer coverage targets in the El Alto subsystem fixed in request for approval and bid by Aguas del Illimani

Year	Private water connections (% bid)	Sewer connections (% fixed)
2001	100	41
2006	100	43
2011	100	47
2016	100	71
2021	100	90
2026	100	90

Source : The World Bank (1998b)

Water tariff

Article 49 of the Regulation 1994 incorporates the principle for determining water tariff. The tariff has to be guided by various principles such as

- efficiency,
- neutrality,
- affordability,
- equity,
- sufficiency,
- simplicity, and
- transparency.

The regulation also laid down the meaning of such principles.

- By economic efficiency, it is understood that the tariff should not reflect the cost of inefficient management, and would not permit the introduction of non-competitive prices keeping in mind the productive efficiency, and that tariff structure should give a correct signal to users about the shortage of potable water resources requiring its efficient use.
- It should be non-discriminatory.
- Tariff structure should be such as to redistribute costs reflecting the capacity of payments by various users.
- Tariff should guarantee the recovery of costs and expenses of operation including expansion, renovation, and maintenance of the system, while permitting sufficient remuneration to service providers, and enabling them to utilize technologies and managerial efficiencies that guarantee the best quality, continuity, and security to the users.
- Tariff structure should be such that its comprehension is easy.
- Tariff determination process should be made public.

It is further stipulated that in case there is any conflict amongst the above principles, the criteria of efficiency and sufficient financial guarantee should have priority in the determination of tariff. In case there is any contradiction between the criteria of efficiency and sufficient financial guarantee, the latter will prevail.

Article 50 of the Regulation of 1994 sets out a principle that would govern the rates in the non-concessionable zones. Such tariff, should recover

- cost of operation and maintenance, and
- cost of repair that would guarantee the sustainability of service and assurance to the users for a lower cost.

Under Article 51 as regards equity in determination of tariff, stipulates that

- whenever there exists justification on equity grounds without compromising the economic efficiency criteria, the regulator should permit the differentiated tariff structure among the groups of users; and
- in areas where the capacity of payments by the users is less than the amount which could be recovered, the public budget is expected to incorporate such funds so as to expand the services in these areas.

The prices and tariff of the potable water and sanitation services served by municipalities would have to be approved by the regulator according to regulation subject to intimation to the municipal government. The tariff so determined would be maximum tariff, and there should be a formula for indexation of prices. The indexation

formula will include a component that reflects the adjustments due to variation in prices and a component for change of rates and taxes as framed by the government during the period of concession. The revision of tariff should be subject to the base studies initiated by the holder of the concession according to the terms of reference determined by the regulator. The regulator may agree with, modify, or reject the findings of the tariff studies. The tariffs and the formulae of indexation of tariffs would be valid for a period of five years.

Prior to 1994, SAMAPA did not charge water tariff to achieve full cost recovery in its service areas. Tariff was low, and water utility depended on government's resources. Following the principles set out in the 1994 regulation, the concession contract of 1997 provided for automatic renegotiation of tariff once every five years. The tariff is required to be calculated based on the company's projected costs and the cost of expansion for the next five years. In the eventuality of company's costs going beyond seven per cent (due to change in tax laws, etc.), a provision for extraordinary tariff revision after first two years of the contract was incorporated in the concession agreement. The contract also sets maximum connection fees per building at $155 for water and $4180 for sewer. The company charges a uniform tariff for water and sewer services. The contract outlines type of cross-subsidies: industrial, commercial and government users would subsidize service for domestic connections. Tariff is also differentiated between low volume and high volume users.

Rights of users

Article 71 of the Regulation of 1994 outlines the rights of users who are legally connected to the services of potable water and sanitation service. This would include the right to

- receive potable water in quantity and adequate quality in continuous form according to the norms enforced
- request for verification of their consumption
- request for verification of their needs
- claim for compensation for negligence on the part of the service provider before the regulator.

Under the regulation, the local communities have the following rights and obligations as regards the provision of potable water and sanitation services

- To participate actively in the management of services.
- To inform the regulator about the gaps in the provision of such services.
- To participate in the sanitary education programme and to inform to the community about their rights and obligations for such services.

Lessons for Gujarat

- The regulatory legislation should lay down the principles for determining the tariff, and the role of regulator in tariff revision.
- The objectives of private sector participation should be clear, and the legislation should spell out the overall objectives of the government in water and sanitation sector. The regulator has to work within these objectives.
- The involvement of the communities in provision of water and sanitation services is expected to prepare the sector's performance.
- The urban areas in Gujarat can be divided into concession zones as well as non-concession zones. In concession zones, the private partner can provide the water supply and sanitation services through concession agreements, while in non-concession zones, the public utility can deliver such services.

H Chile: case study on water sector reforms

Introduction

Water sector in Chile till recently was largely managed by public-owned companies. The water industry in urban areas has been on a growing path since 1970 as regards its coverage of potable water and connection for sewerage (Table H.1).

Table H.1 Urban water services: indicators

	1970	*1975*	*1980*	*1985*	*1990*	*1995*
Coverage						
Potable water (%)	66.5	77.4	91.4	95.2	97.4	98.6
Sewerage (%)	31.1	43.5	67.4	75.1	81.8	89.2
Sewerage treatment (%)					8.0	14.0
Average connections (1000/year)						
Potable water	45	80	64	53	107	78
Sewerage	20	65	83	58	111	85
Average investment amount (US$ million/ year)	54	40	64	64	136	
Investment per connection (US$/connection)	869	404	234	547	364	703
Operating costs (US$ million)					115	199
Operating costs (US$/new connection)				75	95	
Staffing	13,500 (1973)	7,000	3,000 (1979)			

Source IADB (1999)

The coverage of potable water services has always been more than that of sewerage services. The sewerage treatment facilities were not developed and covered less than 10% of population in 1990. The cost for connection for water service in 1990 was $132 (Table H.2). Many companies felt the need for additional resources to expand and maintain various urban services. For instance, the EMOS (Empresa Metropolitana de

Obran Sanitarian) which was the metropolitan (Santiago) sanitary works enterprise till the late 1980s, lacked funds to maintain and expand its water and sanitary works although it was efficiently managed and did not face any water shortage or have large unmet demand. Its low cash flow was compounded by the government's restriction on its borrowing from the market. In particular, there was shortage of funds for meeting the target for developing sewerage network: a target of 52% coverage by 2000 for sewerage treatment would require an investment of about 400 million dollars every year, a figure almost double the amount spent in 1995. Water quality in urban areas was not very high. An analysis of water samples in 1992 showed that 8.3% of the total of services monitored had bacteriological problems, 6.3% had chlorine waste; 26.7% did not comply with chemical quality standards, and 40.7% of the sample water was turbid (Savedoff et al. 1999).

The water sector also witnessed fluctuation of workforce serving in various government companies: in 1960 the Bureau of Water Works (DOS) had a workforce of 3800 employees which increased to 13500 in 1973, and then plummeted to 3000 when the water industry was reorganized.

Table H.2 Operating costs (1995 US dollars)

Year	Costs (million)	Connection (thousand)	Cost per connection
1990	203	1.533	132
1991	233	1.751	133
1992	221	1.828	121
1993	215	1.909	112
1994	202	2.018	100
1995	199	2.100	95

Source IADB (1999)

Till 1977, Chile's water industry was monitored by the Bureau of Water Works (DOS) under the Ministry of Public Works. The other state agencies in the water sector included the Division of Water and Sewerage Services (Ministry of Housing and Urban Planning), the Potable Water Company of Santiago (Municipality of Santiago), the Municipal Sewerage Company of Valparaiso, Vina del Mar (Municipality of Valparaiso), and the Office of Rural Sanitation (Ministry of Health). Since DOS was a part of the central government, it had no administrative or financial independence. There were other agencies working in the water sector although their main functions related to real estate developments. These small companies were not initially subject to formal

regulation. Most of these companies were not able to finance themselves with the rates set for them, later on, by the Ministry of Economy.

Table H.3 Evolution of water industry

	Water industry
Baseline 1973	Various state offices and agencies, overlapping in zones and responsibilities, Low rates and high costs
Operational adjustment 1974-78	Rate increase; operating costs cut
Reorganization	Unification of the industry (1977) into one autonomous state body; separation along geographical lines and establishment of companies under private law (1990)
Regulatory framework	Gradual application of long-term self-financing rates (1990-94)
Privatization	Creation of a regulatory framework; 8 concessions for new real estate developments

Source IADB (1999)

In 1977, SENDOS (National Service of Water and Sewerage Works) (Table H.3) was created by law as an autonomous institution, and it combined all government activities in the potable water supply and sewerage industry operating directly in 11 regions in Chile. Its regulatory jurisdiction also extended over two autonomous companies operating in the other regions: EMOS, or the Water and Sewerage Works Company in Santiago, and ESVAL, or the Water and Sewerage Company in Valparaiso, which were free to manage their own revenues. SENDOS operated independently, enforced water tariff that was set periodically by the government, and established standards and development plans for water supply and sewerage services. Further, private companies in urban areas were also supervised by SENDOS, and their rates continued to be set by the government.

In the early 1990s, the government set up 13 state-owned corporations covering the jurisdiction of the urban services administered by EMOS, ESVAL, and the erstwhile 11 regional SENDOS offices. These corporations were entrusted with the assets

management and operation of services including the responsibility for making investment decisions. As a part of the water sector reforms, the government enacted a series of water laws between 1988 and 1990 that set the framework for

- creating a regulatory body (Superintendency of Water and Sewerage Services and defining its powers and responsibilities) (1990)
- subsidy demand for low income users (1989)
- detailing the grant of water and sewerage concession (1989)
- setting water tariff principle (1988).

Under law DFL No. 382 MOP 1989, a set of rules were enacted setting the principle for granting concessions. The law permits companies already in existence to be issued concessions in areas they are serving, but they have to formalize the terms and conditions of the concessions according to the procedures laid down under the general law. These concessions could be transferable and differentiated into potable water production, potable water distribution, waste water collection, and waste water disposal and treatment. Concessions could be granted for specific locations, and the water supply and sewerage services have been made obligatory within a restricted geographical area, which was originally limited to population being served, and also areas included under the expansion plans under way. The legislation mandates a regulatory body to take steps for issuing concessions for an indefinite time period to such companies.

Law No. 18902 of 1990 created a regulator called Superintendent of Water and Sewerage Services with a separate legal entity and assets under the supervision of the president of republic through the Ministry of Public Works. It is mandated to

- set tariff
- set and enforce technical standard
- monitor, award, and revoke water and sewerage concession
- control liquid industrial effluent
- apply sanctions.

In the event of a conflict between the regulator and the concessionaire, there is a mechanism for arbitration through a commission of three experts: one appointed by the regulator, second by the concessionaire, and the third by the regulator based on a list previously agreed upon with the regulators. The rulings of the expert commission are appellable to the court.

Although, quality of water services and sewerage system is set by the Ministry of Health, the regulator is required to oversee the compliance with water quality standards and services in general. It also lays down goals for extending coverage within the concession area in case the targets are not fulfilled. In the event of non-compliance with

such goals, the law provides a system of sanctions ranging from fines to terminating the concession.

The water companies[56] are required to submit regular information on costs and service to the Superintendent of Water and Sewerage Services, failing which the company would be fined.

Tariff policy

Till 1976, water rates in Chile used to be very low and could not sustain the water supply services efficiently. However, this changed when it was felt that users charges should be gradually hiked for reaching the goal of self-financing in water sector (Table H.4).

Table H.4 Water charges (US $/cubic metre, constant currency)

Company	1989	1990	1991	1992	1993	1994	1995
Northern zone							
ESSAN (desert)	0.45	0.50	0.74	0.78	0.80	1.29	1.29
Central north (semi desert)							
ESVAL	0.33	0.39	0.41	0.44	0.49	0.57	0.72
Central zone							
EMOS	0.22	0.27	0.28	0.30	0.34	0.34	0.39
Central south							
ESSBIO	0.21	0.29	0.32	0.37	0.38	0.41	0.46
Southern zone							
ESMAG	0.33	0.36	0.45	0.52	0.53	0.63	0.68

Note Figures are for December of each year.
Source IADB (1999)

The new legislation (DFL 70, 1990) in the water sector laid down the principles for tariff determination, thus giving a little scope for regulatory manipulation. All formulae and definition of variables being used for tariff setting are spelled out in details in the law. The regulator is required to determine the tariff on the basis of the above principles. The philosophy behind the tariff policy was to give a signal to potential investors that the government was committed to not expropriating their return on capital through underpricing, and would contain the chance of their monopoly rents. The tariff setting process (Figure H.1) was, however, complex: for each company, a benchmark efficient firm is to be estimated by the regulator keeping in mind the company's geographic,

[56] All water companies were required under the new law to enter into a new concession contract with the government.

demographic, and technological conditions. Parameters such as water collection rates are set for performing at efficient levels. The 'model enterprise' is required to consider development plans for meeting demand projections Thereafter, tariff is set to cover new investment plus operation and maintenance costs associated with meeting forecast growth and to allow a benchmark firm to a minimum annual return on assets (seven percent). Simultaneously, long-term total costs are calculated, and tariff calculated in the first stage is adjusted by such a factor so as to ensure that the company can break even over five years. Thereafter, tariff is indexed for inflation.

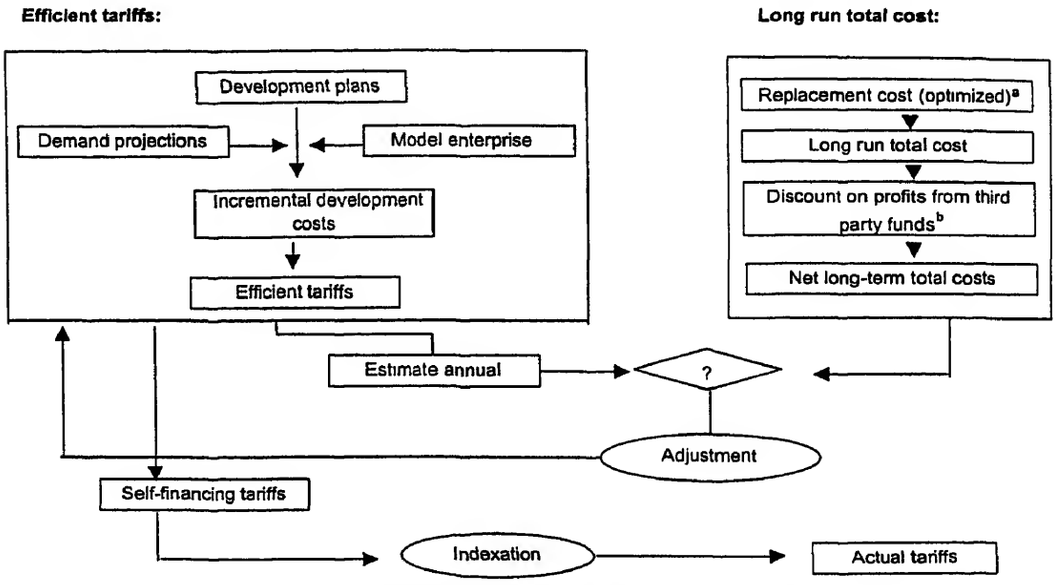


Figure H.1 Tariff setting process

Source World Bank (2000c)

Subsidy issues

Under law No. 18778 of 1989, the government introduced a subsidy programme for low income users. The subsidy, which would be used for paying potable water and sewerage discharge bills of low income users, is administered by the municipalities. The local bodies are required to enroll and select applicants based on certain criteria. The companies are then informed about the details of the low income users. The municipality pays the subsidy amount directly to water companies, who then subtract the appropriate amount from each householder's water bill. The subsidy programme is

intended to ensure that no family pays more than five percent of its income for water and sewerage.

An estimate in 1995 showed that the subsidy benefited 17.6% of residual customers. However, it cost the government about 423 million dollars or 5.2% of the total billing of water companies. The application of the subsidy principle enabled the sector to become self-financing in the long run by gradually eliminating cross-subsidies. Although water rates almost doubled between 1989 and 1995, there was not much protest from consumers, as the rates paid by the low income user did not rise due to subsidy.

Private sector participation

Although the water sector was doing satisfactorily under the state management, the government felt the need to improve regulation in water industry with an explicit framework for privatizing state-owned companies for involving private financing and technology and improving management. The conditions in the water sector became favourable for private sector participation because of the reform measures. The legislation in 1990 in water sector authorized the government to sell its shares in the two largest companies, EMOS and ESVAL. Privatization of other companies was limited to a 49% ceiling. The main private sector participation options used by the government included (a) granting concession for new services, (b) BOT (build-own-transfer) contracts, (c) transfer of concessions, and (d) sale of companies. In the case of waster water treatment, BOT contract was opted for the city of Antofagasta (through a contract between Biwater and ESSAN in the north zone of Chile). The management contract for the entire water distribution system, including production and distribution of potable water and collection and disposal of waste water, is being considered for the southern coastal area of region five (through a contract between ESVAL and Aguas Quinta). In the city of Valdivia, the state-owned ESSAL company awarded a concession to a private company (Savedoff et al. 1999).

Lessons for Gujarat

- Law should clarify the tariff policy, whereby regulatory discretion could be substantially reduced.
- Decision-making should be transparent.
- Strong political commitment is necessary to carry out successful reforms in the water sector.
- Yardstick competition being used in the tariff setting process can improve efficiency of the water companies.

I Trinidad and Tobago: case study in private sector participation

Introduction

Till 1996, the water and sewerage services were solely administered by the Water and Sewerage Authority or WASA, in Trinidad and Tobago. However, performance was not satisfactory (Table I.1). The quantity of water unaccounted for was very high and there were restrictions on the availability of water during the day. Labour cost (60%) was a large component of its total operating costs. Water tariff was low, and for nearly 50 years till 1980, tariff rates remained the same. The WASA was not able to generate sufficient revenue to even cover the operating expenses. By 1994, its financial position was such that the government had to bear 800 million dollars as accumulated government transfer to the WASA.

Table I.1 Performance of the Water and Sewerage Authority prior to 1996

Parameters	Performance
Staff for 1000 connections	12.8*
Unaccounted for water (%)	45
Sewerage connection (%)	30
Meters connection to 240 000 customers (%)	1
Population that receives water less than 12 hours a day (%)	40

*against 1.5-2 for efficiently run utilities in developed countries

Source World Bank (1998)

Thus the government decided to introduce PSP (private sector participation) in the management of water services. It did not opt for the concession route for the PSP during the initial period because increasing the price would require an amendment of the existing law, which would be time-consuming and require political support. Secondly, there was very little information on the water and sanitation infrastructure needed for preparing a proper long-term concession agreement document. Further, the regulatory

capacity was not adequate and the government needed time to establish an effective rate-setting mechanism ensuring competitive bidding for the concessional agreement.

The government opted for a two-phase strategy while introducing private participation in the water sector. Under an interim management (1996), a private operator would be responsible for O&M (operation and maintenance) of the water supply and sewerage system and for meeting investment targets. There is an agreed business plan and targets for achieving coverage and quality. Further, the operator is required to collect information to help the government develop a tariff regulatory regime. Under the interim arrangement, WASA is responsible for new investment, billing, and collection.

The management fee for the private operator consisted of a fixed element and an element as bonus for meeting specified targets. The switchover to the permanent operating arrangement may take place any time after three years of the initial contract date. Under the new arrangement, the private operator will be required to finance investment, billing, and collection, in addition to the existing responsibilities. The new arrangement would cover a period of 30 years.

The proposals for the PSP were evaluated in a complex manner. First, the technical proposal was evaluated on the basis of business plan, increase in water service, coverage qualification and experience of candidates for top management, series of performance targets based on the requirements, fixed and bonus elements of the management fees, etc. More points were assigned to those willing to undertake more risks by linking their remuneration more to performance-related targets than to fixed fees. All the five firms in the running scored the minimum points for their technical proposals and were considered for the next stage in the financial valuation. Second, the financial evaluation considered the amount of non-guaranteed loan that each bidder would extend to WASA in order to cover its operating deficits, interest rate on loan, and management fees. Third, each bidder submitted a supplementary proposal. It was designed to obtain information on alternative options to the management contract. These included request for proposals for a water treatment plant in Trinidad and Tobago. This was meant to provide safeguard, in case the management contract was found unattractive.

The arrangement for PSP included a provision to allow winning bidders preferential rights for the concession contracts at the end of the management services contract. Thus, once there is a switchover long-term concession contract, it was envisaged that the existing private operator could be invited to negotiate the terms and conditions of the contract. If such an arrangement failed, a competitive bidding process would be undertaken, which would exclude the existing operator.

Regulatory framework

The PUC (Public Utility Commission) sets tariff through a quasi-judicial process. The government reconstituted the Water Resources Agency of the WASA into an independent government agency, which would be responsible for monitoring water quality. Under the new arrangement the PUC should monitor activities of the private operator, and set a process to allow cost recovery in water sector. In 1995, water tariff was increased by 35% for customers receiving water more than 12 hours a day.

Lessons for Gujarat

In the initial stages, the management contract option for PSP may enable the public service provider and the private operator to develop terms and conditions for a complex long-term concession agreement.

J UK: case study on regulatory framework

Introduction

Prior to the privatization of the British Water Industry, responsibility for providing water and sanitation services rested on various municipalities and private water companies. The water industry was rationalized from time to time with the reorganization of local governments, and there were about 160 undertakings and 1300 sewerage operators in England and Wales in 1973. A year later, these undertakings were substituted by 10 regional water authorities whose boundaries were based on the catchment areas of major rivers. The regional water authorities were responsible for managing the river basin, including quality and quantity of water supply and sewage disposal. The government gave loans to the authorities for capital investment. Water prices were set at a low level, and level of service was largely determined by these authorities. Further, 29 private water companies, not responsible for sewage treatment, continued to provide water services in England and Wales. The water companies were guided by their board of directors, representing local and business interest. Prices were set as low as possible. These companies raised funds for capital investment in their areas by issuing fixed dividend stock. By 1989, 10 regional water authorities were privatized and steps were taken to rationalize these companies. The reasons behind such a move was that as a public sector activity, the government fell short of funds in maintaining and improving the infrastructure required for water services. Along with these financial pressures, there was increasing pressure for meeting higher standards for drinking water and waste water treatment. This came from the public and also from the European Legislation. About 50 billion pound sterling was estimated to be required between 1989 and 2005 to meet the standards required by the EEC (European Economic Commission).

In England and Wales, privatization was seen as the only answer to achieving the government's aims of increased efficiency and access to private funds for investment. So in 1989, the water industry in England and Wales was privatized. The operational and regulatory functions of the ten Water Authorities were separated. Companies were created with responsibility for the authorities' operations, and the authorities' assets were transferred to them. These companies were then sold to the public. Initially, the government kept a golden share in each company, so as to retain some measure of

control over their ownership, but these were soon sold, and the Government now owns no share of any of the water companies. The companies operate under licences, granted initially for 25 years. The licences can be revoked after that period, although ten years notice period has to be given. If that should happen, the assets would be transferred to another company on appropriate terms. The old private water companies which had continued to exist were brought within the same licensing and regulatory system as the newly privatized companies. Under their licences the privatized companies are required to provide waste water services for all the customers in their areas, and to provide water for customers who are not served by the old water companies.

Regulatory framework

The regulatory functions of the England and Wales water authorities passed on to the following three regulatory bodies which were created on privatization:

- The DWI (Drinking Water Inspectorate),
- The EA (Environment Agency) is responsible for protecting the environment, and improving the quality of rivers, estuaries, and coastal waters. It controls discharge consents (i.e. licences which set out conditions under which organizations can pump treated sewage or industrial waste into water), encourages water conservation, redistribution and expansion surface and groundwater supplies, and issues licences for abstracting water from river and borewells.
- OFWAT

All the regulators are independent of government, and their roles and powers are defined in legislation. The Director-General of Water Services heading the OFWAT is appointed by the secretary of state for the Environment, Transport and the Region, and is the economic regulator for the water industry. It regulates water and sewerage companies in a fair manner to help them continuously improve quality of service. Among others, the regulator

- sets price limits for water and sewerage bills
- ensures that companies fulfil their legal responsibility
- sets the standards of service to customers
- promotes economy and efficiency of companies
- promotes competition in the industry
- publishes reports on company's performance
- publishes information to encourage poor performers to reach up to the standard of the best companies
- advises on mergers involving water and sewerage companies

- deals with complaints against water companies and settles disputes between customers and water companies and sometimes between developers or landowners and water companies.

The other organization regulating the water sector in UK is the Competition Commission (formerly Monopolies and Mergers Commission) hears appeals on OFWAT's decisions on price limits, and disputes on its licence modification.

Quality of service

The OFWAT sets standards of service to consumers and monitors their compliance by water companies on the following parameters.

- Inadequate water pressure
- Supply interruptions
- Restrictions on use of water
- Flooding from sewers
- Billing contacts
- Written complaints
- Ease of telephone contact
- Adequacy of water resources.

Under 'inadequate pressure' indicators, the OFWAT monitors the number of domestic properties which received or are likely to receive pressure below a certain reference level when water demand is normal. The reference level is defined as 10 metres head of pressure at the boundary stop tap with a flow of 9 litres per minute. The alternate reference level often used is 15 metres head of pressure in the distribution main that supplies the property, as it is very difficult to measure pressure and flow at the boundary of every customer's property. Companies are expected to maintain a register which identifies the properties that are likely to receive low pressure. The 'supply interruption' indicator shows the number of properties experiencing unplanned and continuous interruptions for more than 6 hours, 12 hours, and 24 hours. The indicator on 'restrictions on use of water' shows the percentage of company's population that has had restrictions imposed on them regarding use of hose pipes or sprinkler / unattended hose pipe, non-essential use of water during drought, drought orders imposing stand pipes, etc. Under 'flooding from sewers' one indicator would show the number of properties likely to be affected by sewer flooding due to overloading more than 12 times in 10 years and more than once in 10 years and the other could show the number of properties affected by internal flooding due to problems such as blockages. The 'billing contacts' indicator would show the total number of written and telephone billing

contacts received by a company, and the number of such complaints dealt with in 2, 5, 10, 20 and more than 20 working days. The percentage of metered customers who receive at least one bill during the year based on actual meter reading is indicated under 'bills for metered customers'. Under this parameter, the company is also required to report on the number of meters that they have not read in 2 years or more. The 'ease of telephone contact' indicator would show speed of response for telephone contact within 15 and 30 seconds, the number of abandoned calls, and amount of time all lines to the company were engaged. Adequacy of water resources of each company is also monitored.

The OFWAT benchmarks each water company on a scale of five (very good and very poor), and publishes the same. These profiles help the regulator to set targets for improving the performance of companies that perform poorly. The regulator also compares the performance of water companies with those in other sectors such as electricity, water, gas, etc.

Water quality

In UK, because of public pressure as well as the Green lobby in keeping this regulation function under the ambit of the government, the government is regulating water quality standards through its Drinking Water Inspectorate under the Department of Environment, Transport, and Regions. It has two roles: through its audit role, it carries out annual inspections of companies, and checks the results of monitoring and the reliability of data on tests carried out by companies. It also investigates incidents where standards are breached. If monitoring shows that water companies are failing to meet the required standards, the Inspectorate takes enforcement action. Under the current regulation, companies are required to say what they propose to do to secure compliance with the standards, and then, give legally binding undertakings in relation to that action. The investigation of incidents can similarly lead to enforcement action, and it can also lead to prosecutions of water companies if they have not exercised due diligence in carrying out their work. Drinking water standards in the UK derive mainly from the EC (European Commission) Drinking Water Directive. Companies are required to carry out nearly three million tests on their drinking water supplies each year, and to report the results to the Inspectorate.

The parameters for water quality are (a) microbiological quality of water leaving treatment works and (b) microbiological quality of water in service reservoirs and (c) water quality in water supply zones. The microbiological quality of water is measured in terms of coliforms and faecal coliforms factors, in addition to these two. The water quality in the water supply zones is measured in terms of coliform, faecal coliform, colour, turbidity, odour, taste, hydrogen ion, nitrate, nitrite, aluminium, iron, manganese,

lead, PAH, trihalomethanes, total pesticides, individual pesticides, etc. Of late, the Drinking Water Inspectorate has been implementing the EC Drinking Water Directives 98/83/EC, which contain mandatory directives to be implemented by specified dates and the non-mandatory directives to be used for monitoring purposes (Annexes J.1 and J.2).

The quality of water and sewage effluents is subject to strict control. In the event of neglect, criminal sanctions may be imposed on the directors of the company. Performance is audited every year by the Drinking Water Inspectorate. The report is placed before the government and each company is required to maintain registers of analytical results for public scrutiny. The quality of sewage effluent is also monitored for BOD (biochemical oxygen demand), suspended solids, etc., and other parameters such as metals and colour.

In 1992 there were some 50 000 test failures. By 1998 this number came down to just over 6000, representing a pass rate of 99.8%.

Environmental agency

Originally, the National Rivers Authority took on the regulatory functions of the public water authorities before their privatization. In 1996, the authority was brought together with Her Majesty's Inspectorate of Pollution (responsible for air quality, the regulation of major industries etc.) and local waste regulation authorities, to form the EA. Like the old water authorities and the National Rivers Authority, the EA functions on the basis of integrated river basin management.

The agency has five significant water related functions

- water resource management
- control of discharges
- monitoring of river and coastal water quality
- land drainage and flood defence
- fisheries management.

As with the DWI, the EA has extensive powers to prosecute companies, including water companies, who cause pollution or fail to comply with their discharge consents.

All significant water abstraction in England and Wales require licences, which only the EA can issue. These are largely licences of right, and stipulate a charge of abstraction which is sufficient to cover the EA's cost in carrying out its water resources function, which at present only cover its direct costs in administering the system, but does not primarily take into account the external costs. The charges are set according to the licensed volumes, but not on the actual abstracted volume of water. Thus, there is no incentive for any water company to take less water than allowed by the licence. In 1996, a total of 48600 abstraction licences were issued amounting to 24 614 000 mega litres of

water per annum, of which only 53% were actually extracted. In 1996/97, the average abstraction charge was 0.3 pence per cubic metre for raw water, which was subsequently sold to domestic customers after purification and distribution at an average price which is 20 times over the cost price.

The government is considering the possibility of introducing economic instruments to control abstractions, which would imply significant increase in charge, particularly in relation to environmentally damaging abstractions.

The agency also has a water conservation role, to ensure the efficient use of water and adoption of sensible demand management measures.

Consents are required from the agency for all significant discharges. The standards for consents derive mainly from EC directives, such as those on urban waste water treatment, bathing waters, dangerous substances, freshwater fish and shellfish waters. The consents apply to continuous discharges, such as those from sewage works and also to intermittent discharges.

The agency also controls the disposal of sewage sludge, where recent EC legislation required an end to dumping at sea, and will restrict disposal by landfill. This has lead to a significant increase in the amount of sludge recycled to agricultural land, and UK controls on this have recently been tightened significantly to ensure public safety.

The agency has achieved major improvements in water quality in recent years. These have been achieved to a large extent through tighter regulation of the water industry which as in many other countries, is the most significant source of water pollution. Between 1990 and 1995 the proportion of rivers of good chemical quality increased from 48% to 60%, with the proportion of poor quality decreasing from 16% to 10%. The EA has now proposed that the government should aim to eliminate all impurities from rivers by 2005.

The impact of water quality improvements is probably best judged by looking at the quality of the individual major rivers in England. The Thames is now the cleanest metropolitan river in Europe, if not the world. Over 100 species of fish have been caught in it in recent years, including salmon. The river Trent, which receives effluent from major cities such as Birmingham and Nottingham, is now clean enough to use as a drinking water source. There have also been major improvements in the quality of water in the river Tyne, which flows through Newcastle, and the Mersey, which receives effluent from the Manchester and Liverpool areas.

Water tariff

In contrast to the US 'rate of return' model for tariff fixation, the UK government adopted the so-called Austrian Model of Price Regulation. The latter relies on the price cap approach rather than the annually fixed rate of return. Each private company is

required to prepare detailed asset management[57] plans for establishing the need for investment as regards maintenance and enhancement of water supply and sewerage disposal systems. These plans are examined by independent consultants and certified in terms of viability, costs, and necessity. Parameters such as capital expenditure needs and operating cost forecasts were considered for setting tariffs. A formula is established for price rises every year, under which the price rise is RPI (retail price index) – X + K where X is an efficiency factor and K is a factor dependent on capital expenditure needs. The formula was revised in 1999 and the change in price is RPI – X + Q + V + S, where Q is the cost of meeting new environment needs, V is the cost of meeting supply and demand balance, and S is the cost of enhancing a particular element of a process.

The latest review of price limits, which sets limits for the period 2000–2005, has just been completed. The limits that have been set allow for capital investment of 15 billion pound sterling over this period, equivalent to 3 billion pound sterling annually. The price limits would require price cuts averaging over 12% in real terms in 2000, with average prices remaining around 11 percent below current levels in real terms by 2005.

These proposed price limits compare with significant price increases that customers had to pay over the first 10 years following privatization, mainly to enable the companies to deal with backlog of maintenance and quality improvement. Also, initially, there was an underestimation of efficiency improvements that the companies would be able to make. These averaged 5% annually in real terms between 1990 and 1995, and 1.4% per year between 1995 and 2000.

Customer complaints

The OFWAT has 10 independent Regional OFWAT Customer Service Committees to deal with customer complaints and to monitor services of the water companies. At the national level, there is an OFWAT National Customer Council to deal with customer complaints. The OFWAT has prescribed the performance standards of these committees. For instance, the Customer Service Committee is to start action on a customer complaint within five working days of it being lodged in 97% cases.

Promoting competition

The OFWAT provides a framework for competition to be developed where it will benefit customers. It is expected to create a level playing field to establish competition in economic terms. Common carriage would be vital in promoting such competition. It

[57] These plans normally include capital costs, asset stock, operating costs, and financial information. Asset stock includes information, condition, and serviceability of stock.

administers the 'inset appointment' process, presses for more competition for rights to water resources, and uses comparative competition until market competition is sufficiently established to take over. Till January 2000, six inset licences were granted (in 'inset appointments', one company replaces another as the statutory undertaker for a specified geographical area). Cross- border supplies, when a customer may choose a different supplier outside his earmarked area, is yet to be developed in UK.

Comparative competition

Regulators can compare the utilities to judge their performance. The UK regulator (namely OFWAT) benchmarks companies against each other to estimate their efficiencies at a given point of time or over a period of time. The cost and performance information is used by OFWAT in its periodic price reviews with the companies. This information is available to the public, which provides indirect pressure to company shareholder, companies peer groups as well as company's customer. Publication of transparency information includes key reports such as

- Levels of service
- Cost of water delivered
- Financial performance and capital investment
- Leakage and water efficiency.

The UK regulator uses sophisticated benchmarking using statistical techniques to compare the company's efficiencies.

Benefits of private sector involvement

A clear regulatory system is vital not only for the delivery of the standards that governments set, but also for successful private sector involvement in the water sector. The clearer the system, the lower the risk that companies has to face. Lowering risks reduces the cost of their involvement, as banks will be willing to lend them the money they need at lower interest rates. Clear regulation also reduces the administrative and legal costs of private sector involvement by reducing the extent to which common issues have to be dealt with each time a contract is negotiated. These cost reductions will result in lower charges.

The principal benefit of privatization in England and Wales has been that the water industry was freed from the constraints of government spending and from government interference in its operations. This freedom has enabled the companies to invest some 3 billion pound sterling annually in recent years, and this level of investment is expected to continue until at least 2005. By then they will have invested some 2 billion pound

sterling of public funds on investment each year. In contrast in 1998/99 the water companies paid some 440 million pound sterling in tax.

This investment, coupled with the tough regulatory framework, has delivered significant improvements in drinking water quality and major reductions in the environmental impacts of the water industry's activities. Price increases were needed in the first 10 years to fund the investment and maintenance backlog that existed at the time of privatization. However, the companies have generated efficiency improvements far in excess of those that the government envisaged, whereby prices have risen less than that would have been necessary had they remained in the public sector. The benefits of those efficiency improvements are now being passed to consumers in the price cuts that have taken place this year.

The creation of three independent regulators has delivered a transparent, publicly accountable regulatory system with a great deal of information about the performance of the industry available to customers and other interested parties.

A further benefit of privatization is that water companies are now able to compete externally, exporting their expertise and experience. The UK government believes that they have much to offer other countries as they tackle their water supply and waste water treatment challenges. Many of the UK companies are now assisting other countries in the development of their own water sectors. Indeed, some of water companies now have more customers overseas than in England. The experience and expertise that they have gained as private companies operating under such regulatory regimes is helping other countries ensure that lessons do not have to be learned again.

Lessons for Gujarat

- The extent of regulatory oversight should be high in the divestiture mode of private sector participation.
- Price cap regulation promotes efficiency in operation of companies.
- Quality of service rules should be set and strictly enforced so that the water companies subject to price cap regulation do not lower their quality of service.
- Comparative competition through benchmarking of companies can improve the efficiency of water service providers. It is possible to compare the utilities in water and sanitation sector in Gujarat on the basis of parameters for improving efficiency and performance of these utilities. In this connection, it may be mentioned that TERI has already undertaken a project supported by the United Nations Development Programme / Ministry of Environment and Forests, Government of India, in respect of 'rating' select municipalities under the project titled USERS (urban services environment rating system). A similar initiative can be undertaken in urban municipalities in Gujarat in respect of water supply and sanitation services.

- Consultation with customers in tariff setting and enforcement of quality of standards should be encouraged.
- The UK experiment shows that governments can retain control and secure real improvements in service and quality standards and in efficiency even with full-scale privatization, provided effective regulatory regimes are established.
- Due to privatization, the water companies are freed from government interference and from constraints of government spending.
- The investments coupled with a strong regulatory framework delivered significant improvements in drinking water quality. Efficiency was improved, the benefits of which can be passed on to consumers.

Annex J.1 Mandatory standards under EC Drinking Water Directives 98/83/EC

Parameter	Current regulatory standard	New directive mandatory standard	Comment
Faecal coliforms (no./100 ml)	0		Parameter name change
E coli (no./100 ml)		0	
Faecal strept cocci (no./100 ml)	0		Parameter name change
Enterococci (no./100 ml)		0	
Acrylamide (µg/litre)		0.10	Control by product specification
Antimony (µg/litre)	10	5.0	
Arsenic (µg/litre)	50	10	
Benzene (µg/litre)		1	
Benzo 3,4 pyrene (µg/litre)	0.01[a]	0.01	
Boron (mg/litre)	2.0[a]	1.0	
Bromate (µg/litre)		25	By end 2003
		10	By end 2008
Copper (mg/litre)	3.0	2.0	
1,2 dichloroethane (µg/litre)		3.0	
Epichlorohydrin (µg/litre)		0.10	Control by product specification
Lead (µg/litre)	50	2.5[b]	By end 2003 monitoring
		10[b]	To be decided by end 2013
Nickel (µg/litre)	50	20	
Nitrite (mg/litre)	0.1	0.1	Ex works
		0.5	Consumers taps
Nitrate/nitrite		Formula[c]	
PAH (µg/litre)	0.2		6 substances including fluroanthene
		0.1	4 substances excluding fluroanthene
Tetrachloroethene (µg/litre)	10	10	Sum of 2 substances
Trichloroethane (µg/litre)	30	10	

Trihalomethanes (µg/litre)	100[d]	150 v	By end 2003 By end 2008	Sum of 4 THMs
Vinyl chloride (µg/litre)		0.5	Control by product specification	

[a]annual average, [b]weekly average, [c]the formula is [nitrate]/50 + [nitrite]/3 ≤ 1; [d]three monthly average

Source DWI (1998)

Annex J.2 New non-mandatory indicator values under EC Drinking Water Directives 98/83/EC

Parameter	Current regulatory standard	New directive indicator value	Comments
Aluminium (µg/litre)	200	200	
Iron (µg/litre)	200	200	
Manganese (µg/litre)	50	50	
Chloride (mg/litre)	400[a]	250	
Colour (mg/l Pt/Co)	20	Acceptable to consumers and no abnormal change	
Odour (no dilution)	3	-	
Taste (no dilution)	3	-	
Turbidity (FTU)	4	-	
NTU		1	Strive for ex works
Coliforms (no./100 ml)	0[a]	0	
Conductivity (µS/cm at 20°C)	1500[b]	2500	
Hydrogen ion	5.5 minimum	6.5 minimum	
	9.5 maximum	9.5 maximum	
Sodium (mg/litre)	150[c]	200	
Oxidizability (mg O_2/litre)	5	5	
Sulphate (mg/litre)	250	250	
Sulphite reducing clostridia (no./20 ml)	≤1		Parameter name change
Clostridium perfringens (no./100 ml		0	Surface waters
Radioactivity			
Tritium (Bq/l)		100	Monitoring to be decided
Total indicative dose (MSv/year)		0.1	Monitoring to be decided

[a]95% of results must comply, [b]annual average, [c]three yearly average

Source DWI (1998)

K List of persons met

Gujarat

Ahmedabad Municipal Corporation

- Mr Kailashnathan, Municipal Commissioner
- Mr MK Das, Deputy Municipal Commissioner
- Mr MK Darji, Senior Legal Assistant
- Mr HN Desai, Additional City Engineer, Water Supply
- Mr HV Hindocha, Assistant Manager (MBA)
- Mr UC Padia, Assistant Municipal Commissioner
- Mr Rama Prasad, Advisor (Pollution)
- Mr ZA Sancha, Assessor and Tax Collector
- Mr BR Seth, Additional City Engineer, Drainage Project and Slum Networking Project
- Mr VA Vaghela, Officer on Special Duty

Department of Narmada, Water Resources, & Water Supply, Government of Gujarat

- Mr M S Patel, Secretary (Water Resources)
- Mr M I Mehta, Secretary (Narmada & Major Irrigation Schemes)
- Mr R K Tripathy, Secretary (Water Supply)

Gujarat Infrastructure Development Board

- Mr R Saxena, Chief Executive Officer
- Mr A Chakraborty, Former Chief Executive Officer
- Mr D C Jha, Deputy Manager, Water Resources

Gujarat Water Supply and Sewerage Board

- Mr R K Tripathy, Chairman
- Mr K B Patel, Member Secretary

Gujarat State Drinking Water Infrastructure Company Limited

- Mr P K Taneja, Managing Director
- Mr B J Vasavada, Chief General Manager

Legislative and Parliamentary Affairs Department, Government of Gujarat

- Ms H K Jhaveri, Secretary, Legislative and Parliamentary Affairs Department, Government of Gujarat

Rajkot Municipal Corporation

- Mr J P Gupta, Municipal Commissioner
- Mr V Anadkat, Technical Assistant to Commissioner

Urban Development Department, Government of Gujarat

- Dr M Subramanium, Principal Secretary, Urban Services, Government of Gujarat

Sardar Sarovar Narmada Nigam Limited

- Mr C K Koshy, Managing Director
- Mr Shah, General Manager

Karnataka

Bangalore Water Supply and Sewerage Board

- Ms U Ganesh, Chairman
- Mr C M Easwar, Secretary
- Mr M N Thippeswamy, Chief Engineer (Planning)

Karnataka Urban Water Supply and Drainage Board

- Mr B S Reddy, Managing Director

Urban Development Department, Government of Karnataka

- Mr S K Kumar, Principal Secretary
- Ms S Kumari, Secretary

Tamil Nadu

Chennai Metropolitan Water Supply & Sewerage Board

- Mr C P Singh, Managing Director
- Mr S Jayaraman, Finance Director
- Mr D Madhavmoorti, Superintending Engineer, Quality Assurance Wing
- Mr V N Prakashan, Junior Accounts Officer
- Mr M Thirunavukkarasu, Superintending Engineer

Government of Tamil Nadu

- Ms S Malathi, Secretary, Municipal Administration & Water Supply

New Tirupur Area Development Corporation Ltd.

- Mr M Raman, Managing Director
- Mr M C Srikanth, Chief Financial Officer
- Mr S Srinivasan, Technical Consultant

Tamil Nadu Water Supply & Drainage Board

- Mr Kashivishwanathan, Managing Director

International agencies

Department of Environment, Transport and Regions, Government of United Kingdom

- Mr A Davis, Director, Water and Land

Sector Experts

Consumer Organizations

- Prof M Shah, Managing Trustee, Consumer Education and Research Centre

HUDCO

- Mr K Subramanium, Chief Projects (Infrastructure)

Indo-US, FIRE Project

- Mr Lee Baker, Chief of Party
- Mr V Satyanarayana, Senior Infrastructure Finance Advisor
- Mr Chetan Vaidya, Senior Urban Management Advisor
- Ms K Devi, Project Development Specialist

National Institute of Urban Affairs

- Dr U P Raghupati, Associate Professor

Tata Energy Research Institute

- Dr R K Pachauri, Director
- Mr Rakesh Kacker, IAS, Senior Fellow

Others

- Mr P U Asnani, Urban Environment Infrastructure Representative, India, US-AEP
- Mr N M Bijlani, Chairman, NRD Associates Pvt. Ltd.

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